# THE PLANT DISEASE REPORTER

Issued by

THE PLANT DISEASE SURVEY, DIVISION OF MYCOLOGY AND DISEASE SURVEY
BUREAU OF PLANT INDUSTRY, SOILS, AND AGRICULTURAL ENGINEERING
AGRICULTURAL RESEARCH ADMINISTRATION
UNITED STATES DEPARTMENT OF AGRICULTURE

Vol. XXIX June 1, 1945 Number 19



The Plant Disease Reporter is issued as a service to plant pathologists throughout the United States. It contains reports, summaries, observations, and comments submitted voluntarily by qualified observers. These reports often are in the form of suggestions, queries, and opinions, frequently purely tentative, offered for consideration or discussion rather than as matters of established fact. In accepting and publishing this material the Division of Mycology and Disease Survey serves merely as an informational clearing house. It does not assume responsibility for the subject matter.


## IN THIS ISSUE


Check list revision, by Freeman Weiss, page 468

Incidence of organisms on wheat and barley seed grown in Minnesota and the Dakotas is reported by Ian W. Tervet, page 474

Prevalence of diseases on small grains is reported from Arkansas by Howard W. Larsh, page 487, and from Missouri by T. W. Bretz, page 492; with short reports from various States, page 493

Black stem is serious in some Pennsylvania alfalfa fields according to Robert C. Cassell, reporting this and other alfalfa diseases, page 494. Other diseases reported on legumes are stem nematode on alfalfa in Idaho, soybean mosaic in Louisiana, and leaf spot on vetch in California.

Results of a survey for Armillaria root rot in the Santa Clara Valley of California are reported by Henry Schneider, E. W. Bodine, and H. Earl Thomas, page 495

Diseases reported on fruit crops, page 496

J. S. Tidd reports observations in conifer windbreaks and nurseries in Illinois, page 499

C. M. Wright reports appearance of potato late blight on Long Island, and Douglas C. Bain reports occurrence in Southern Mississippi, page 502.

K. Starr Chester, page 503, has devised a "quiz" to determine individual accuracy in estimating crop losses.



LIBRARY
CURRENT SERIAL RECORD
☆ JUL 31 1945 ☆
U. S. DEPARTMENT OF AGRICULTURE

## CHECK LIST REVISION

Freeman Weiss

### POLYPOGON (GRAMINEAE)

POLYPOGON MONSPELIENSIS (L.) Desf., RABBITFOOT GRASS. European annual established in waste ground in coastal areas of the Northeast and locally in low ground from the Gulf Coast to Calif. and the Pacific Northwest; of minor forage value and furnishes food for wildlife.

Erysiphe graminis DC., powdery mildew. Calif., Oreg., Utah, Wash.
Puccinia coronata Cda. (II, III), crown rust. Calif.
P. graminis Pers. (II, III), stem rust. Nebr. Var. avenae Eriks. & Henn.

### PUCCINELLIA (GRAMINEAE)

PUCCINELLIA DISTANS (L.) Parl. (1), and P. NUTTALLIANA (Schult.) Hitchc. (2), ALKALI GRASS. Perennials of moist, usually alkaline, sites chiefly in the West from the Plains to the Pacific Coast, and locally in the Lakes States and the Northeast near the coast; of minor forage value, especially the var. Zawadke of (2); these and P. NUTKAENSIS (Presl) Fern. & Weath. (3), occurring in salt marshes near the Pacific Coast, furnish food for wildlife.

Cladosporium herbarum Pers. ex Lk., leaf mold. Oreg. (1)
Claviceps purpurea (Fr.) Tul., ergot. Wash. (1)
Erysiphe graminis DC., powdery mildew. Wash. (1)
Puccinia glumarum (Schm.) Eriks. & Henn. (II,III), stripe rust. Wash. (2,3). Also on Puccinellia lemmoni (Vasey) Scribn., and P. limosa (Schur.) Holmb. in Wash.
P. graminis Pers. (II,III), stem rust. Calif. (2), Mich. (1), Wash. (1,2,3).
P. poae-sudeticae (West.) Jørst. (II,III), leaf rust. Wash. (2)
P. rubigo-vera (DC.) Wint. (II,III), leaf rust. Calif. (2), Colo. (2), N. Dak. (2), Oreg. (2,3), Utah (2), Wash. (1,2,3), Wyo. (2). Var. agropyri (Eriks.) Arth.
Selenophoma donacis (Pass.) Sprague & A. G. Johns. var. ---, speckle. N. Dak. (2)
Ustilago hypodytes (Schlecht.) Fr., stem smut. Calif. (2), Wash. (1).

### REDFIELDIA (GRAMINEAE)

REDFIELDIA FLEXUOSA (Thurb.) Vasey, BLOWOUT GRASS. Perennial with strong creeping rhizomes, occurring in sand hills from S. Dak. to Okla. and Ariz.; valuable for soil binding.

Physalospora sp., on awns, N. Dak.
Puccinia redfieldiae Tracy (II,III), leaf rust. Colo., Kans., Nebr., N. Dak. O and I unknown
Tilletia redfieldiae Clinton, seed smut. Nebr.

RYNCHOSPORA (CYPERACEAE)

RYNCHOSPORA SPP., BEAKRUSH. Numerous spp. of mostly perennial sedge-like plants occurring in bogs and wet soil throughout the U.S., more frequent in the East, and especially the South and tropical America; important food plants for wildlife.

Amerosporium macrochaeta Ell. & Ev., on leaves and culms of R. corniculata (Lam.) A. Gray in La.

Cercospora crinospora Atk., leaf spot. On R. glomerata (L.) Vahl in Ala.

Cintractia affinis Pk., culm smut. On R. corniculata in N. Y.

C. farlowii Clint., seed smut. On R. glomerata in N. J. and other spp. in Fla. and Mass.

C. leucoderma (Berk.) P. Henn., stem and inflorescence smut. On R. corymbosa (L.) Britt. in Canal Zone and P. R., R. cyperoides Mart. and others in P. R.

C. montagnei (Tul.) Magn., seed smut. On R. alba (L.) Vahl in Conn., Me., Mass., N. Y., Vt.; on R. glomerata in Conn., Del., Ind., Mass., Miss., N. Y., and other spp. in Fla., N. and S. Car., and P. R.

C. pachyderma H. Syd., culm smut. On R. corniculata in Fla.

C. striata Clint. & Zundel, culm smut. On R. tracyi Britt. in Fla.

C. taubertiana (P. Henn.) Clint., seed smut. On R. alba in Mass., N. J., N. Y., and Pa.; on R. axillaris (Lam.) Britt. in La. and Miss.; on R. cymosa Ell. in Md.; and other spp. in Ala., Fla., S. Car., Tex., and Va.

C. utriculicola (P. Henn.) Clint., seed smut. On R. corymbosa in P. R.

Guignardia rhynchosporae F. L. Stevens, on leaves. P. R.

Himantia stellifera Johnston, on culms. P. R.

Meliola circinans Earle, black mildew. Fla., P. R.

M. cyperi Pat. (? M. argentina Speg.), Fla., P. R.

Puccinia angustata Pk. var. angustatoides (Stone) Arth. (II,III), leaf rust. On R. corniculata in Ala., Fla., La., Mo., Tenn., Tex. and P. R.; on R. corymbosa and R. cyperoides in P. R. O and I unknown.

P. cladii Ell. & Tracy (II,III), rust. On R. glomerata in Va. O and I unknown.

P. consobrina Arth. & Holw. (II,III), rust. On R. corymbosa in P. R. O and I unknown.

Rhopographus clavisporus (Cke. & Pk.) Sacc., on culms. Ga.

Sorosporium rhynchosporae P. Henn., seed smut. On R. semiplumosa A. Gray in Miss.

Testicularia cyperi Klotzsch, inflorescence smut. On R. corniculata in N. Y., Fla., La., Tex., and other spp. in Fla.

Uromyces rhyncosporae Ell. (II,III), leaf rust. On various spp. from Vt. to Mich., Fla., and La., also in the West Indies and Hawaii. O and I unknown.

SACCHARUM (GRAMINEAE)

SACCHARUM OFFICINARUM L., SUGAR CANE. Cult. for sugar and syrup in the Gulf States from Fla. to Tex. but principally in La., also throughout the West Indies and in Hawaii; also furnishes cane by-products and is sometimes used for forage. The modern cultivated varieties are derived in part from S. SINENSIS Roxb., S. BARBERI Jeswiet and S. SPONTANEUM L. as well as from S. OFFICINARUM, all giant grasses of southern and southeastern Asia and neighboring islands. The parent species show marked differences in reaction to some of the diseases, advantage of which has been taken in breeding commercial varieties, but in the following list no attempt is made to discriminate between the component species of cultivated sugar cane.

Allantospora radicicola Wakker, on roots and other parts, probably as a saprophyte. Hawaii

Alternaria sp. (A. tenuis Nees ex Wiltshire), on canes and leaves, also on roots, probably as a saprophyte. Cosmopolitan.

Apiospora camtospora Penz. & Sacc., on fading leaves. P. R.

Arthrobotrys superba Cda., on canes and leaves. P. R.

Aspergillus spp., mold on canes, sugar and byproducts; saprophytic but sometimes important in sugar deterioration. All spp. of more or less cosmopolitan distribution, those commonly mentioned as economically important include A. flavus Lk., A fumigatus Fres., A. herbariorum (Wigg.) E. Fisch., A. nidulans (Eidam) Wint., A. niger v. Tiegh., A. penicillioides Speg., A. repens (Cda.) DBy. & Wor., A. sydowii (Bainier & Sartory) Thom & Church, A. terreus Thom. A form of A. flavus, designated A. parasiticus Speare, is reported on mealy bugs infesting cane in P. R. and Hawaii.

Asterostroma cervicolor (Berk. & Curt.) Mass., on basal leaf sheaths. P. R.

Bacillus megatherium DBy. and B. mesentericus Trevisan, on cane causing sugar deterioration. La.

Bacterium rubrisubalbicans (Christopher & Edg.) Burgw., mottled stripe. La., P. R. Originally on D-74 var. and its hybrids, rare as these have become obsolete.

B. rubrilineans and B. vascularum. See Xanthomonas

Ceratostomella adiposum Sartoris and C. paradoxa Dade. See Endoconidiophora.

Cercospora longipes Butl., brown spot. Ala., Fla., La., P. R.

C. vaginae Krueger, red leaf-sheath spot. Fla., La., P. R., Hawaii

Chytridium sp., in roots of plants affected with Lahaina disease. Hawaii. An organism of Chytrid affinities has been reported also in the vascular tissue of plants affected with chlorotic streak in Hawaii.

Cladosporium herbarum Pers. ex Lk., gray-green mold of cut leaves and cane. Cosmopolitan.

Clathrus columnatus Bosc, stinkhorn; saprophytic on plant debris but has been considered a factor in root decay. Gulf States, Hawaii, P. R.

Colletotrichum falcatum Went, red rot. General. Conidial stage of Physalospora tucumanensis

SACCHARUM OFFICINARUM cont.

(Coniosporium arundinis (Cda.) Sacc.): Papularia sphaerosperma.

Corticium sasakii (Shirai) T. Matsu., (? Rhizoctonia grisea (Stevenson) Matz), on leaf blades, sheaths and stalks; "banded sclerotial disease". La., P. R. A Pellicularia.

(C. solani (Prill. & Del.) Bourd. & Galz.): Pellicularia filamentosa

Curvularia sp., on roots, ? secondary root rot. La.

C. lunata (Wakk.) Boed., on leaves and canes. Hawaii.

Cytospora sacchari Butl., sheath rot. Ga., La., P. R.

(Diplodia cacaoicola P. Henn.): Physalospora rhodina

Endoconidiophora adiposa (Sartoris) Davidson, black rot of seed cane. La., Hawaii

E. paradoxa (Dade) Davidson, "pineapple rot" of seed cane. Gulf States, Hawaii, P. R.

Eriosphaeria sacchari (Breda de Haan) Went, red leaf spot. Hawaii

Fusarium spp., associated with root rot, cane and leaf rots, seed cane rot, and sugar deterioration. Gulf States, Hawaii, P. R.

(F. moniliforme Sheldon): Gibberella fujikuroi

Gibberella fujikuroi (Saw.) Wr., top rot, pokkah boeng. Gulf States, Hawaii, P. R. Typically found in nature in the conidial state.

G. fujikuroi var. subglutinans (Wr. & Reinking) Edwards, pokkah boeng. La., Hawaii

Gloeocercospora sorghi D. Bain & Edg., zonate leaf spot. La.

Gnomonia iliau Lyon, leaf-sheath and cane spot, "iliau" disease. La., Miss., Hawaii.

Graphium sacchari Speg., on leaves and cane. P. R.

Helminthosporium sacchari (Breda de Haan) Butl. (H. ocellum Faris), eye spot, Florida ring spot. Gulf States, Hawaii, P. R.

H. stenospilum Drechs., brown stripe. Fla., Ga., La., Hawaii, P. R. The ascigerous stage has been produced in cultures in Hawaii and designated Ophiobolus stenospilus Carpenter, also in Japan as Cochliobolus stenospilus T. Matsu. & Yamamoto, neither with formal description.

Heterodera marioni (Cornu) Goodey, rootknot. Gulf States, Hawaii, P.R.

Himantia stellifera Johnston (? Odontia saccharicola Burt), on leaf sheaths and roots. Hawaii, P. R.

Hoplolaimus sp., in roots. Hawaii. H. coronatus Cobb has been found parasitizing sugar cane roots in greenhouse cultures.

Hormiactella sacchari Johnston, on leaves, ? wither-tip. Fla., P. R.

Hypocrea gelatinosa Tode ex Fr. (? H. rufa Pers. ex Fr.), on canes and leaf sheaths. See also Trichoderma lignorum

Ithyphallus rubicundis (Bosc) E. Fisch., stink-horn. On cane trash as saprophyte but has been considered a factor in root decay. Hawaii.

Leptosphaeria sacchari Breda de Haan, on leaves, associated with ring spot. Cosmopolitan. Often cited as the cause of ring spot, this relation doubtful but this fungus may play a secondary role.

Ligniera vascularum (Matz) Cook, in vascular tissue of stem bases causing or associated with dry top rot. P. R. Described as Plasmodiophora vascularum Matz, it is excluded from this genus by Karling; it has also been placed in Sorosphaera. W. R. I. Cook held that 2 organisms of protozoan affinity were involved: Amoebosporus saccharinum W. R. I. Cook and A. vascularum (Matz) W. R. I.

SACCHARUM OFFICINARUM cont.

Cook. The spelling should be vasculorum.

Lophodermium sacchari Lyon, on leaves. Hawaii.

Lophodermium sp. also in P. R.

Macrophoma sacchari (Cke.) Berl. & Vogl., on culms. Ga.

Marasmius sacchari Wakk., on roots and stem bases, associated with root disease complex. Hawaii, P. R., Virgin Is.

M. stenophyllus Mont., associated with root decay. Gulf States. Several other spp. of Marasmius occur on dead cane parts.

Melanconium sacchari Mass. ap. Speg., rind disease, cane rot, a factor in sugar deterioration. Cosmopolitan.

Microdiplodia melaspora (Berk.) Griff. & Maubl., on culms. P. R. In part = Melanconium sacchari

Mycosphaerella sacchari (Speg.) Seaver & Chardon, on leaves, associated with wither-tip. P. R.

M. striatiformans Cobb., on leaves associated with leaf-splitting. Hawaii

Myriogenospora aciculisporae Vizioli, tangle-top. La.

Nectria spp., on dead or sometimes living but moribund canes. Fla., Hawaii, P. R. N. flavociliata Seaver and N. laurentiana El. Marchal (= Creonectria laurentiana (El. Marchal) Seaver & Chardon) are reported in P. R.

Nematodes. A number of genera of nematodes have been reported on diseased roots of sugar cane or in adjacent soil, particularly in Hawaii; they are too numerous to list here in view of the lack of information on their relation to root disease. The genera known to include species parasitic on sugar cane or other plants are: Aphelenchoides, Aphelenchus, Heterodera, Hoplolaimus, Pratylenchus, and Rotylenchus.

Neurospora sitophila Shear & Dodge, on plant debris of all kinds--especially after burning; thought to injure seed cane. La., Hawaii, P. R.

Nigrospora oryzae (Berk. & Br.) Petch, on canes and leaves, secondary leaf spot. Cosmopolitan.

Odontia saccharicola Burt, leaf-sheath adhesion and rot. Hawaii, P. R.

Olpidium sacchari M. T. Cook, in roots, ? secondary rot. P. R.

Papularia sphaerosperma Pers. ex Hoehn. (P. arundinis (Cda.) Fr.), on dead culms. Cosmopolitan

P. vinosa (Berk. & Curt.) Mason, on moribund parts of leaves and culms. La., P. R.

Pellicularia filamentosa (Pat.) Rogers (Rhizoctonia solani Kuehn), secondary (?) root rot, basal sheath rot. La., P. R.

Periconia sacchari Johnston, on moribund leaves. P. R.

Phyllosticta sorghina Sacc. (P. hawaiiensis Caum), secondary leaf spot. Gulf States, Hawaii, P. R. P. sacchari Speg. is considered synonymous. A different Phyllosticta (? P. saccharicola P. Henn.) has been shown to be the conidial stage of Leptosphaeria sacchari.

Physalospora rhodina (Berk. & Curt.) Cke. (Diplodia cacaoicola P. Henn., D. theobromae (Pat.) Nowell), dry rot, internal rot of canes; seed cane rot. Gulf States and tropical America.

P. tucumanensis Speg. (Colletotrichum falcatum Went), red rot. La., P. R. General in conidial stage.

Plasmodiophora vascularum Matz. See Ligniera v.

SACCHARUM OFFICINARUM cont.

Polyporus spp., on dead culms, probably saprophytic. P. R. The following spp. reported: P. occidentalis Klotzsch, P. sanguineus L. ex Fr.) Meyer, P. tulipiferus (Schw.) Overh.

Poria ambigua Bres., on base of culms. Fla.

Pratylenchus pratensis (De Man) Filip., in roots. Hawaii; also in U. S. in greenhouse cultures.

Psilocybe atomatoides Pk., discoloration and deterioration of bagasse (crushed and shredded cane), La.

Pythium spp., root rot. Fla., La., Hawaii, P. R. Although numerous spp. have been found associated with diseased roots, P. arrhenomanes Drechs, in southern U. S. and the West Indies, and P. graminicolum Subr. in Hawaii, appear to be the most prevalent and active agents of root necrosis. Other spp. determined to be pathogenic either to roots or to seed cane are: P. aphanidermatum (Edson) Fitz. (Fla., La., Hawaii), P. artotrogus (Mont.) DBy. (La., Hawaii), P. debaryanum Hesse (Ga., La., Hawaii), P. dissotocum Drechs. (La.), P. helicoides Drechs. (Fla.), P. irregulare Buis. (La.), P. mamillatum Meurs (La.), P. monospermum Pringsh. (La.), P. periilum Drechs. (La.), P. rostratum Butl. (Hawaii), P. splendens Braun (Hawaii), P. ultimum Trow (La.), and P. vexans DBy. (La.)

Rhizoctonia ferrugena Matz, secondary (?) root rot. P. R. ? Pellicularia filamentosa

(R. grisea (Stevenson) Matz): Corticium sasakii

R. palida Matz, secondary (?) root rot. P. R.

(R. solani Kuehn): Pellicularia filamentosa

Rosellinia paraguayensis Speg. and R. pulveracea (Ehrh.) Fckl., on dead canes. P. R.

Rotylenchus similis (Cobb) Filip., in roots. La., Hawaii

Saccharomyces zopfii Artari, sugar deterioration. La.

Schizophyllum commune Fr., wound rot of canes. Fla., La., Hawaii, P. R.

Scirrhia lophodermioides Ell. & Ev., on dead cane. P. R.

Sclerotium rolfsii Sacc., basal stalk and leaf-sheath rot. Gulf States, Hawaii, P. R. = Corticium rolfsii (Sacc.) Curzi

(Thielaviopsis paradoxa (De Seyn.) Hoehn.): Endoconidiophora paradoxa

Trichoderma lignorum Tode ex Harz (? T. viride Pers. ex Fr.), green mold of canes, seed cane rot; sugar deterioration. Cosmopolitan. Conidial stage of Hypocrea rufa Pers. ex Fr.

Tuberculariа saccharicola Speg., on dead canes. P. R.

Vermicularia graminicola West., on moribund leaves. P. R. ? Colletotrichum graminicolum.

Xanthomonas albilineans (Ashby) Dowson, leaf scald. Hawaii.

X. rubrilineans (Lee et al.) Starr & Burkh., red stripe. Fla., Ga., La., Hawaii, P. R.

X. vasculorum (Cobb) Dowson, gummosis. P. R.

Xylaria apiculata Cke., on dead canes. P. R.

Chlorotic streak (virus) -- Marmor quartum Holmes. La., Hawaii, P. R.

Mosaic (virus) -- Marmor sacchari Holmes (Saccharum virus 1 K. M. Sm.). General.

Sereh (virus) -- Nanus sacchari Holmes (Saccharum virus 3 K.M.Sm.). Hawaii

SACCHARUM OFFICINARUM conc.

Banded (sectional) chlorosis -- chilling of undeveloped leaves at base by contact with cold (40°-50°F) water. Occasional in southern U. S., Hawaii, and P. R.

Chlorosis -- mineral (iron or manganese) deficiency due to excess of lime. Hawaii, P. R. Coral chlorosis in Hawaii is specifically attributed to iron deficiency, Pahala blight to manganese deficiency.

Dry top rot. See Ligniera vascularum

Dwarf -- cause unknown, a virus suspected. Hawaii.

Galls (stem galls, node galls of Uba variety) -- cause unknown, nematodes or virus suspected. La., Hawaii, P. R.

Iliau. See Gnomonia iliau

Lahaina disease. See Root disease.

Multiple bud (gall multiple bud) -- cause unknown, a virus suspected. La. Possibly the same as Dwarf in Hawaii.

Pahala blight. See Chlorosis

Pokka boeng (bong). See Gibberella fujikuroi

Root disease. In all cultivation areas. Complex pathological condition resulting from or associated with various pathological factors including environmental, nutritional, and biological. The principal nutritional factors cited are aluminum toxicity (? Lahaina disease in Hawaii), soil acidity, and excessive salt concentration. The principal biological factors cited are root injury by snails, centipedes, nematodes, and fungi, especially Pythium; other fungi reported in this connection are Clathrus, Ithyphallus, Marasmius, Rhizoctonia, and Thielaviopsis.

Top rot. Usually identified with pokkah boeng (Gibberella fujikuroi) or red stripe (Xanthomonas rubrilineans).

Twisted top -- attributed to mechanical injury of leaves. Occasional in all cultivation areas.

Wither top -- environmental (excessive water loss), nutritional, secondary effect of root disease, and secondary leaf-infecting fungi.

DIVISION OF MYCOLOGY AND DISEASE SURVEY

## THE MICROFLORA OF WHEAT AND BARLEY SEED GROWN IN MINNESOTA AND THE DAKOTAS IN 1944[1]

Ian W. Tervet

To complement field observations on head blights and scab of wheat and barley and to provide information on the occurrence of pathogens on seeds, samples of wheat and barley were obtained from several sources in Minnesota, North Dakota, and South Dakota. Seed samples were disinfected by immersion in a solution of 0.3% Vatsol containing 0.1% mercuric chloride for 2 minutes, washing in running tap water for 1 minute, followed by soaking

[1]The writer is glad to express his gratitude to the following men who cooperated in this work by supplying seed samples of wheat and barley:
W. J. Leary, Extension Agronomist, North Dakota Agricultural College.
W. F. Buchholtz, Plant Pathologist, South Dakota State College.
Ward Marshall, Minnesota Crop Improvement Association
Jack Larson, Minnesota State Seed Testing Laboratory.

in a solution of 0.3% Vatsol containing 0.35% calcium hypochlorite for 3 to 5 minutes. From the hypochlorite solution, 100 seeds were plated on acidified potato dextrose agar (pH ± 4.5). Determination of the microflora of the seed was made after 10 to 15 days incubation at room temperature (± 24° C).

## Wheat

North Dakota. Samples were obtained from variety demonstration trials grown in 8 locations (Figure 1). Seven varieties of commonly grown varieties were included, 41 samples being tested in all.

Alternaria spp. occurred most frequently, the percentage of seeds infected ranging from 5 to 89. Somewhat less Alternaria occurred in the southwestern counties of Bowman, Slope, and Hettinger than in the counties to the east, but in Hettinger County, Mida wheat had 63% of the seeds infected with Alternaria. None of the wheat samples was heavily infected with the major seed-borne pathogen, Helminthosporium, seed from Burleigh County showing the highest infection (12%) with this fungus. Other counties with relatively high counts of Helminthosporium were Pierce and Traill. Gibberella zeae was found only on some seed lots from Traill and McIntosh Counties, and the data for this fungus are included with Fusarium in Table 1. It is probable that samples from the southeastern counties of Cass and Richland would be more heavily infected with G. zeae than any of the samples tested (see Figure 3 and Table 3 for the adjacent Minnesota counties of Clay and Wilkin). The southwestern counties showed the highest percentage of seeds free from any fungus.

South Dakota. The samples from South Dakota were obtained from seed lots submitted by farmers to the South Dakota Seed Testing Laboratory for germination and purity tests. The distribution of the seed lots covers fairly well the major spring wheat areas in South Dakota (Figure 2) Alternaria spp. predominated on the seeds (Table 2). Infection with Gibberella zeae was much less in 1944 than in 1943, although field observations indicated heavy scab infection in most of Eastern South Dakota. Heaviest infection by G. zeae in 1943 was 74% of the seeds of Regent wheat from Brookings, while a maximum of 22% was obtained in 1944 on a wheat sample from Brown County[2]. Helminthosporium spp. were more abundant on the seeds in 1944 than in 1943, a maximum of 21% infected seeds being recorded, in comparison with the maximum of 4% in 1943.

Minnesota. All of the Minnesota wheat samples were obtained from the Minnesota Crop Improvement Association, and were from fields entered for certification. Forty-six samples were analysed, 37 of the lots being Newthatch, 5 being Rival, with Mida and Regent each being represented once. Two samples of the winter wheat variety, Marmin, were tested.

As in the Dakotas, Alternaria was most frequently found on the seeds (Table 3). Although 1944 was a year of above-normal rainfall, the prevalence of the seed-borne pathogens, Helminthosporium spp. and Gibberella zeae, was relatively low. Maximum infection by Helminthosporium was 31% in a sample of Newthatch from Red Lake County, while heaviest infection by

[2] Ian W. Tervet. Survey of microflora of wheat seed from Minnesota, North Dakota, and South Dakota. Plant Dis. Reptr. 28: 738-740. 1944

G. zeae, 17%, occurred in a sample of Newthatch from Big Stone County. Most of the wheat acreage is now in Western Minnesota and in the Red River Valley, a limited acreage only being grown in the corn belt region in Southern Minnesota, where scab has been most severe. In comparison with 1943, less G. zeae has been found on the seeds, no samples tested being so heavily infected as those from Yellow Medicine County in 1943[3].

Conclusion. In comparison with 1943, seed of the 1944 wheat crop was somewhat less heavily infected with seed-borne pathogens. The results of laboratory diagnosis do not confirm field observations in relation to infection by Gibberella zeae, for field surveys indicated that scab was severe in much of Minnesota, Southeastern North Dakota, and Eastern South Dakota, and extended further north and west than hitherto. It is possible that infection by G. zeae was severe enough to result in much shriveled grain but that conditions favoring scab development occurred for only a short time while the grain was in a susceptible stage. Threshing operations would eliminate much of the lighter seed, leaving plumper seeds relatively free from infection. It is not unusual for seed from plants heavily infected with certain diseases to be sound and relatively healthy.

## Barley

North Dakota. Thirty-six seed lots were obtained from variety demonstration trials in 5 locations (Figure 1).

Less Helminthosporium spp. occurred on the seeds in 1944 than in 1943[4]. Maximum infection of Helminthosporium was 11% on Velvon from Steele County in 1944 (Table 4), while in 1943 maximum infection was 91%. The incidence of Fusarium spp. (including Gibberella zeae) was not high, a maximum of 15% infected seeds occurring on Spartan from McIntosh County. Alternaria spp. were most common on the seeds, minimum infection being 58% on Wisconsin No. 38 from McKenzie County.

South Dakota. The majority of the samples tested were obtained from the South Dakota Seed Testing Laboratory and should represent the type of seed to be planted in 1945 (Figure 4).

Most of the seed lots were heavily infected with the principal seed-borne pathogens, Helminthosporium spp. and Fusarium spp. (including Gibberella zeae). Helminthosporium spp. ranged from a low of 2% infected seeds (Douglas County) to a high of 82% (Aurora County). Infection by G. zeae was relatively low, a maximum of 11% occurring on the seed lot from Gregory County. Other Fusarium spp. occurred on all seed lots, reaching a maximum of 15% in one from Charles Mix County. Very few seeds free from infection were found, only 2 samples from Douglas County being relatively clean.

Minnesota. Few seed lots of barley were certified in Minnesota in 1944, 8 seed lots only being obtained from the Minnesota Crop Improvement Office. The remaining 11 samples tested were obtained from the Seed Laboratory of the Minnesota Department of Agriculture. The difficulty in obtaining sufficient seed samples is indicative of the declining barley

---

3 L. c., see footnote 2

4 Ian W. Tervet. Survey of the microflora of barley seed from Minnesota, North Dakota, and South Dakota. Plant Dis. Reptr. 28: 468-476. 1944

Table 1. The microflora of wheat seed grown in North Dakota in 1944.

| County of origin of seed lot | Variety | Percentage seeds infected with fungi | | | | |
|---|---|---|---|---|---|---|
| | | Sterile | Helminthosporium | Fusarium[a] | Alternaria | Miscellaneous[b] |
| TRAILL | Mida | 2 | 9 | 4 | 85 | 0 |
| | Regent | 3 | 9 | 6 | 82 | 0 |
| | Renown | 6 | 4 | 11 | 79 | 0 |
| | Rival | 2 | 7 | 4 | 85 | 2 |
| PIERCE | Mida | 12 | 9 | 5 | 74 | 0 |
| | Pilot | 3 | 11 | 3 | 83 | 0 |
| | Regent | 8 | 9 | 3 | 78 | 2 |
| | Rival | 14 | 6 | 11 | 69 | 0 |
| | Thatcher | 7 | 4 | 2 | 86 | 1 |
| | Vesta | 8 | 6 | 9 | 77 | 0 |
| McINTOSH | Mida | 9 | 0 | 4 | 83 | 4 |
| | Pilot | 5 | 2 | 4 | 84 | 5 |
| | Regent | 7 | 3 | 0 | 87 | 3 |
| | Rival | 3 | 5 | 4 | 83 | 5 |
| | Thatcher | 3 | 6 | 8 | 78 | 10 |
| | Vesta | 24 | 0 | 8 | 67 | 1 |
| EMMONS | Mida | 27 | 1 | 0 | 63 | 9 |
| | Pilot | 4 | 4 | 4 | 69 | 9 |
| | Regent | 26 | 3 | 5 | 55 | 11 |
| | Rival | 13 | 4 | 1 | 77 | 4 |
| | Thatcher | 2 | 2 | 3 | 75 | 8 |
| BURLEIGH | Mida | 6 | 12 | 7 | 61 | 14 |
| | Pilot | 10 | 12 | 2 | 76 | 0 |
| | Regent | 10 | 9 | 2 | 75 | 4 |
| | Rival | 42 | 6 | 2 | 49 | 1 |
| | Thatcher | 11 | 5 | 1 | 82 | 1 |
| | Vesta | 21 | 11 | 1 | 60 | 7 |
| HETTINGER | Mida | 26 | 0 | 0 | 63 | 1 |
| | Pilot | 47 | 0 | 1 | 46 | 6 |
| | Rival | 44 | 1 | 3 | 46 | 6 |
| | Thatcher | 58 | 2 | 0 | 29 | 11 |
| | Vesta | 51 | 2 | 2 | 39 | 6 |
| SLOPE | Mida | 78 | 0 | 3 | 15 | 4 |
| | Pilot | 55 | 1 | 1 | 41 | 2 |
| | Regent | 84 | 0 | 1 | 14 | 1 |
| | Rival | 57 | 1 | 0 | 42 | 0 |
| | Vesta | 89 | 0 | 4 | 5 | 2 |
| BOWMAN | Pilot | 61 | 0 | 6 | 32 | 1 |
| | Regent | 73 | 0 | 0 | 25 | 2 |
| | Rival | 42 | 0 | 2 | 54 | 2 |
| | Vesta | 74 | 0 | 6 | 19 | 1 |

[a] Includes Gibberella zeae

[b] Penicillium, Aspergillus, Nigrospora, Hormodendron, Phoma, Trichoderma

Table 2. Microflora of wheat seed grown in South Dakota in 1944

| County of origin of seed lot | Percent seeds infected with fungi | | | | | |
|---|---|---|---|---|---|---|
| | Sterile | Helmintho-sporium | Gibberella | Fusarium | Alternaria | Miscel-laneous[a] |
| McCOOK | 9 | 15 | 18 | 8 | 50 | 0 |
| DEUEL | 6 | 7 | 2 | 1 | 80 | 2 |
| CODINGTON | 6 | 13 | 0 | 1 | 80 | 0 |
| HAMLIN | 10 | 5 | 9 | 4 | 72 | 0 |
| MARSHALL | 50 | 18 | 0 | 0 | 27 | 5 |
| DAY | 4 | 5 | 7 | 2 | 82 | 0 |
| CLARK | 5 | 3 | 2 | 3 | 87 | 0 |
| BROWN | 9 | 10 | 22 | 2 | 57 | 0 |
| SPINK | 2 | 12 | 1 | 2 | 83 | 0 |
| CAMPBELL | 18 | 2 | 1 | 4 | 75 | 0 |
| EDMUNDS | 9 | 5 | 0 | 3 | 83 | 0 |
| POTTER | 1 | 6 | 0 | 4 | 88 | 1 |
| FAULK | 8 | 7 | 10 | 3 | 68 | 4 |
| LYMAN | 9 | 2 | 0 | 7 | 81 | 1 |
| JERAULD | 7 | 7 | 6 | 6 | 70 | 4 |
| STANLEY | 28 | 2 | 0 | 14 | 55 | 1 |
| HAAKON | 15 | 15 | 0 | 3 | 67 | 0 |
| JACKSON | 8 | 0 | 0 | 22 | 66 | 4 |
| MEADE | 23 | 0 | 0 | 1 | 65 | 11 |

Table 3. Microflora of wheat seed grown in Minnesota in 1944

| County of origin of seed lot | Variety | Percent seeds infected with fungi | | | | | |
|---|---|---|---|---|---|---|---|
| | | Ster-ile | Helmin-tho-sporium | Gibber-ella | Fusar-ium | Alter-naria | Miscel-laneous[a] |
| KITTSON | Newthatch | 12 | 6 | 0 | 5 | 77 | 0 |
| | do. | 1 | 25 | 0 | 3 | 66 | 5 |
| | do. | 2 | 26 | 2 | 1 | 68 | 1 |
| ROSEAU | Newthatch | 9 | 18 | 2 | 3 | 68 | 0 |
| | do. | 0 | 5 | 0 | 1 | 92 | 2 |
| | do. | 7 | 19 | 0 | 7 | 66 | 1 |
| MARSHALL | Newthatch | 10 | 13 | 0 | 6 | 71 | 0 |
| | do. | 6 | 4 | 0 | 4 | 86 | 0 |
| | do. | 5 | 7 | 1 | 5 | 73 | 9 |
| | do. | 2 | 16 | 2 | 1 | 79 | 0 |
| POLK | Mida | 27 | 3 | 1 | 7 | 59 | 0 |
| | Newthatch | 55 | 3 | 0 | 4 | 36 | 2 |
| | do. | 20 | 13 | 6 | 6 | 55 | 0 |
| | do. | 24 | 24 | 2 | 3 | 44 | 3 |
| | do. | 4 | 6 | 1 | 1 | 87 | 1 |
| RED LAKE | Newthatch | 7 | 31 | 1 | 5 | 48 | 8 |
| | do. | 23 | 3 | 1 | 8 | 65 | 0 |

(Table 3 concluded on following page)

Table 3 conc.

| County of origin of seed lot | Variety | Percent seeds infected with fungi | | | | | |
|---|---|---|---|---|---|---|---|
| | | Ster-ile | Helmin-tho-sporium | Gibber-ella | Fusar-ium | Alter-naria | Miscel-lan-eous[a] |
| NORMAN | Newthatch | 6 | 9 | 0 | 12 | 73 | 0 |
| | do. | 7 | 3 | 9 | 3 | 76 | 2 |
| CLAY | Newthatch | 5 | 17 | 8 | 2 | 64 | 4 |
| | do. | 17 | 3 | 5 | 4 | 70 | 1 |
| BECKER | Newthatch | 15 | 1 | 3 | 1 | 10 | 70[b] |
| | do. | 28 | 8 | 9 | 4 | 51 | 0 |
| WILKIN | Newthatch | 25 | 4 | 8 | 2 | 58 | 3 |
| | do. | 31 | 3 | 1 | 2 | 64 | 0 |
| | do. | 29 | 2 | 4 | 3 | 60 | 2 |
| | do. | 43 | 6 | 2 | 5 | 39 | 5 |
| OTTER TAIL | Newthatch | 20 | 5 | 10 | 4 | 61 | 0 |
| | do. | 21 | 0 | 5 | 2 | 72 | 0 |
| BIG STONE | Newthatch | 24 | 5 | 3 | 2 | 65 | 1 |
| | do. | 16 | 17 | 11 | 0 | 56 | 0 |
| | do. | 26 | 1 | 17 | 0 | 56 | 0 |
| STEVENS | Newthatch | 15 | 5 | 14 | 0 | 66 | 0 |
| | do. | 77 | 1 | 0 | 4 | 18 | 0 |
| | do. | 15 | 21 | 8 | 1 | 55 | 0 |
| POPE | Newthatch | 8 | 3 | 0 | 7 | 80 | 0 |
| MEEKER | Rival | 10 | 13 | 1 | 2 | 73 | 1 |
| YELLOW MEDICINE | Rival | 12 | 7 | 5 | 4 | 71 | 1 |
| CARVER | Marmin | 34 | 12 | 5 | 1 | 47 | 1 |
| HENNEPIN | Rival | 69 | 0 | 0 | 0 | 23 | 8 |
| RAMSEY | Newthatch | 13 | 15 | 5 | 0 | 67 | 0 |
| LESUEUR | Marmin | 16 | 13 | 4 | 2 | 64 | 1 |
| RICE | Rival | 3 | 4 | 5 | 1 | 86 | 1 |
| GOODHUE | Newthatch | 15 | 4 | 8 | 1 | 72 | 0 |
| WASECA | Regent | 11 | 12 | 4 | 0 | 73 | 0 |
| | Rival | 16 | 3 | 2 | 0 | 73 | 2 |

[a] [b] *Aspergillus*, *Acremoniella*, *Penicillium*, *Nigrospora*, *Cephalothecium*
*Aspergillus* spp.

Table 4. The microflora of barley seed grown in North Dakota in 1944

| County of origin of seed lot | Variety | Percent seeds infected with fungi | | | | |
|---|---|---|---|---|---|---|
| | | Sterile | Helmintho-sporium | Fusarium[a] | Alternaria | Miscellaneous[b] |
| STEELE | "L" | 13 | 1 | 1 | 85 | 0 |
| | Manchuria | 15 | 3 | 4 | 76 | 2 |
| | Plush | 5 | 3 | 10 | 75 | 7 |
| | Tregal | 1 | 6 | 9 | 82 | 2 |
| | Velvon | 3 | 11 | 5 | 80 | 1 |
| | Wis. No. 38 | 14 | 3 | 10 | 73 | 0 |
| McINTOSH | "L" | 2 | 1 | 10 | 84 | 3 |
| | Manchuria | 0 | 4 | 8 | 78 | 10 |
| | Plush | 0 | 0 | 10 | 77 | 13 |
| | Spartan | 16 | 4 | 15 | 65 | 0 |
| | Tregal | 0 | 10 | 1 | 84 | 5 |
| | Velvon | 3 | 0 | 11 | 78 | 8 |
| | Wis. No. 38 | 0 | 3 | 4 | 87 | 6 |
| EMMONS | "L" | 10 | 1 | 4 | 83 | 2 |
| | Manchuria | 20 | 1 | 1 | 77 | 1 |
| | Plush | 19 | 3 | 4 | 73 | 1 |
| | Spartan | 8 | 3 | 5 | 83 | 1 |
| | Tregal | 5 | 5 | 1 | 88 | 1 |
| | Velvon | 0 | 4 | 1 | 89 | 6 |
| | Wis. No. 38 | 10 | 3 | 2 | 81 | 4 |
| BURLEIGH | "L" | 10 | 2 | 2 | 85 | 1 |
| | Manchuria | 12 | 6 | 3 | 79 | 0 |
| | Plush | 4 | 9 | 3 | 80 | 4 |
| | Spartan | 1 | 7 | 9 | 42 | 1 |
| | Tregal | 11 | 6 | 3 | 80 | 0 |
| | Velvon | 14 | 1 | 2 | 83 | 0 |
| | Wis. No. 38 | 2 | 4 | 5 | 78 | 11 |
| McKENZIE | Plush | 30 | 1 | 0 | 67 | 2 |
| | Velvon | 8 | 2 | 4 | 84 | 2 |
| | Wis. No. 38 | 40 | 1 | 1 | 58 | 0 |

[a] Includes Gibberella zeae

[b] Penicillium, Aspergillus, Rhizopus, Hormodendron, Phoma, Nigrospora

Table 5. The microflora of barley seed grown in South Dakota in 1944

| County of origin of seed lot | Percent of seeds infected with fungi | | | | | |
|---|---|---|---|---|---|---|
| | Sterile | Helmintho-sporium | Gibberella | Fusarium | Alternaria | Miscellaneous[a] |
| GRANT | 3 | 18 | 4 | 2 | 71 | 2 |
| BROOKINGS | 1 | 30 | 4 | 13 | 51 | 0 |
| STANLEY | 1 | 45 | 3 | 2 | 49 | 0 |
| MELLETTE | 0 | 22 | 3 | 6 | 68 | 1 |

Table 5 continued on following page

Table 5 concluded

| County of origin of seed lot | Percent of seeds infected with fungi | | | | | |
|---|---|---|---|---|---|---|
| | Sterile | Helmintho-sporium | Gibberella | Fusarium | Alternaria | Miscellaneous[a] |
| GREGORY | 0 | 56 | 11 | 5 | 28 | 0 |
| CHARLES MIX | 3 | 49 | 3 | 8 | 30 | 7 |
| | 0 | 71 | 2 | 15 | 12 | 0 |
| AURORA | 0 | 82 | 6 | 10 | 2 | 0 |
| | 0 | 52 | 14 | 9 | 25 | 0 |
| DAVISON | 14 | 62 | 0 | 1 | 21 | 1 |
| DOUGLAS | 61 | 20 | 2 | 1 | 3 | 1 |
| | 80 | 2 | 0 | 2 | 16 | 0 |
| CLAY | 0 | 46 | 3 | 2 | 48 | 1 |

[a]Rhizopus, Cephalothecium, bacteria, Aspergillus, Penicillium

Table 6. The microflora of barley seed grown in Minnesota in 1944

| County of origin of seed lot | Variety | Percent seeds infected with fungi | | | | | |
|---|---|---|---|---|---|---|---|
| | | Ster-ile | Helmintho-sporium | Gibber-ella | Fusar-ium | Alter-naria | Miscel-laneous[a] |
| KITTSON | Wis. No. 38 | 89 | 1 | 0 | 1 | 9 | 0 |
| | Plush | 13 | 13 | 1 | 2 | 69 | 2 |
| | Wis. No. 38 | 55 | 9 | 0 | 3 | 43 | 0 |
| | Wis. No. 38 | 30 | 10 | 4 | 4 | 52 | 0 |
| MARSHALL | --- | 0 | 0 | 3 | 6 | 55 | 47 |
| POLK | Mars | 13 | 1 | 1 | 3 | 81 | 1 |
| | Mars | 4 | 0 | 0 | 6 | 88 | 2 |
| BECKER | Wis. No. 38 | 46 | 3 | 0 | 0 | 4 | 47 |
| KANABEC | Wis. No. 38 | 2 | 65 | 1 | 1 | 26 | 5 |
| STEVENS | Mars | 5 | 25 | 12 | 3 | 55 | 0 |
| CHIPPEWA | --- | 2 | 18 | 21 | 2 | 57 | 0 |
| MEEKER | Wis. No. 38 | 3 | 40 | 2 | 3 | 51 | 1 |
| | Wis. No. 38 | 1 | 64 | 0 | 2 | 32 | 1 |
| RAMSEY | Mars | 4 | 7 | 3 | 1 | 85 | 0 |
| LINCOLN | Wis. No. 38 | 2 | 41 | 2 | 0 | 55 | 0 |
| COTTONWOOD | --- | 94 | 0 | 0 | 1 | 2 | 3 |
| MARTIN | Wis. No. 38 | 32 | 1 | 0 | 1 | 11 | 55 |
| | --- | 10 | 28 | 2 | 1 | 49 | 0 |
| WASECA | Mars | 2 | 1 | 3 | 0 | 93 | 1 |

[a] Mucor, Aspergillus, Penicillium, Phoma, Cephalothecium

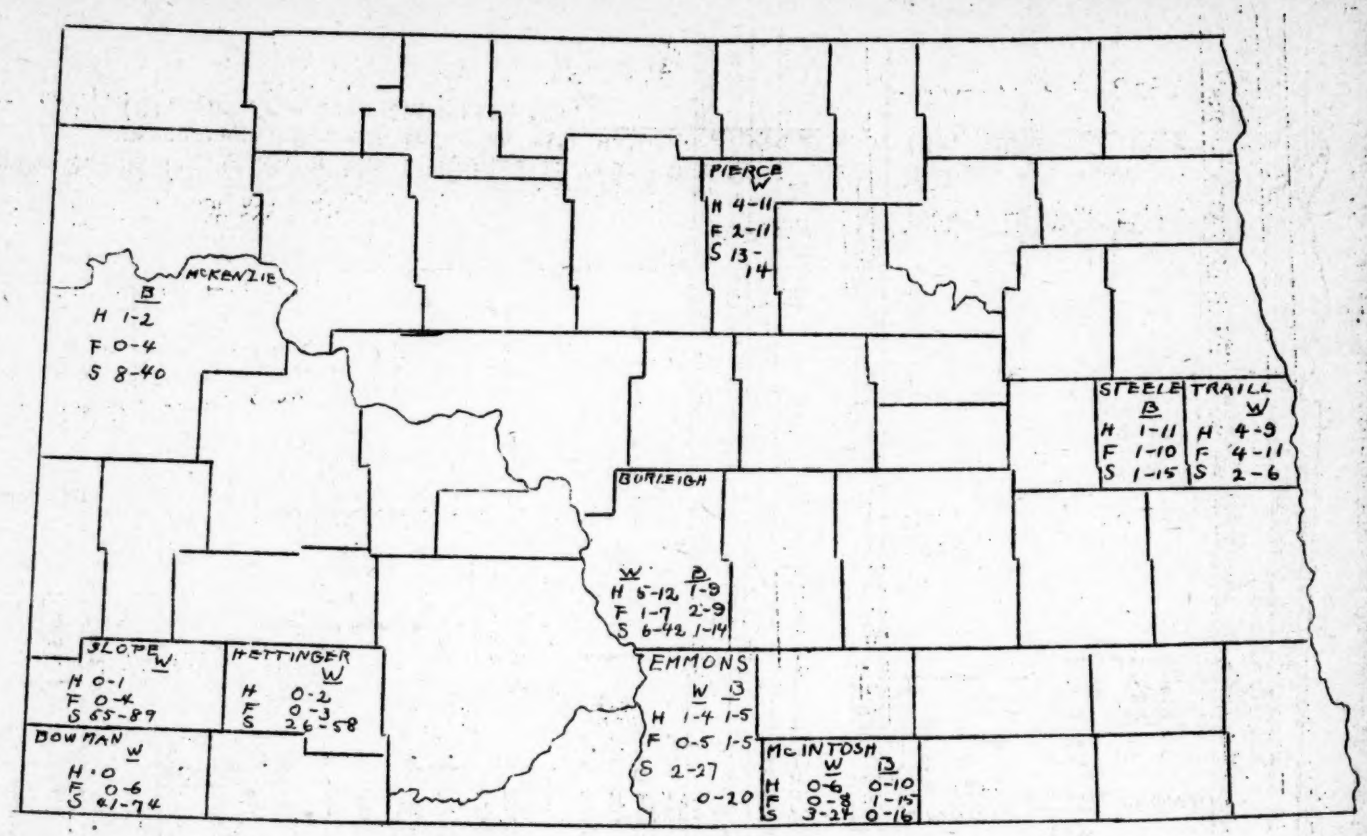


Figure 1. Distribution of wheat (W) and barley (B) in North Dakota in 1944. Numbers represent range in percentage of seeds infected with Helminthosporium spp. (H), Fusarium spp. (F), and free from infection (S)

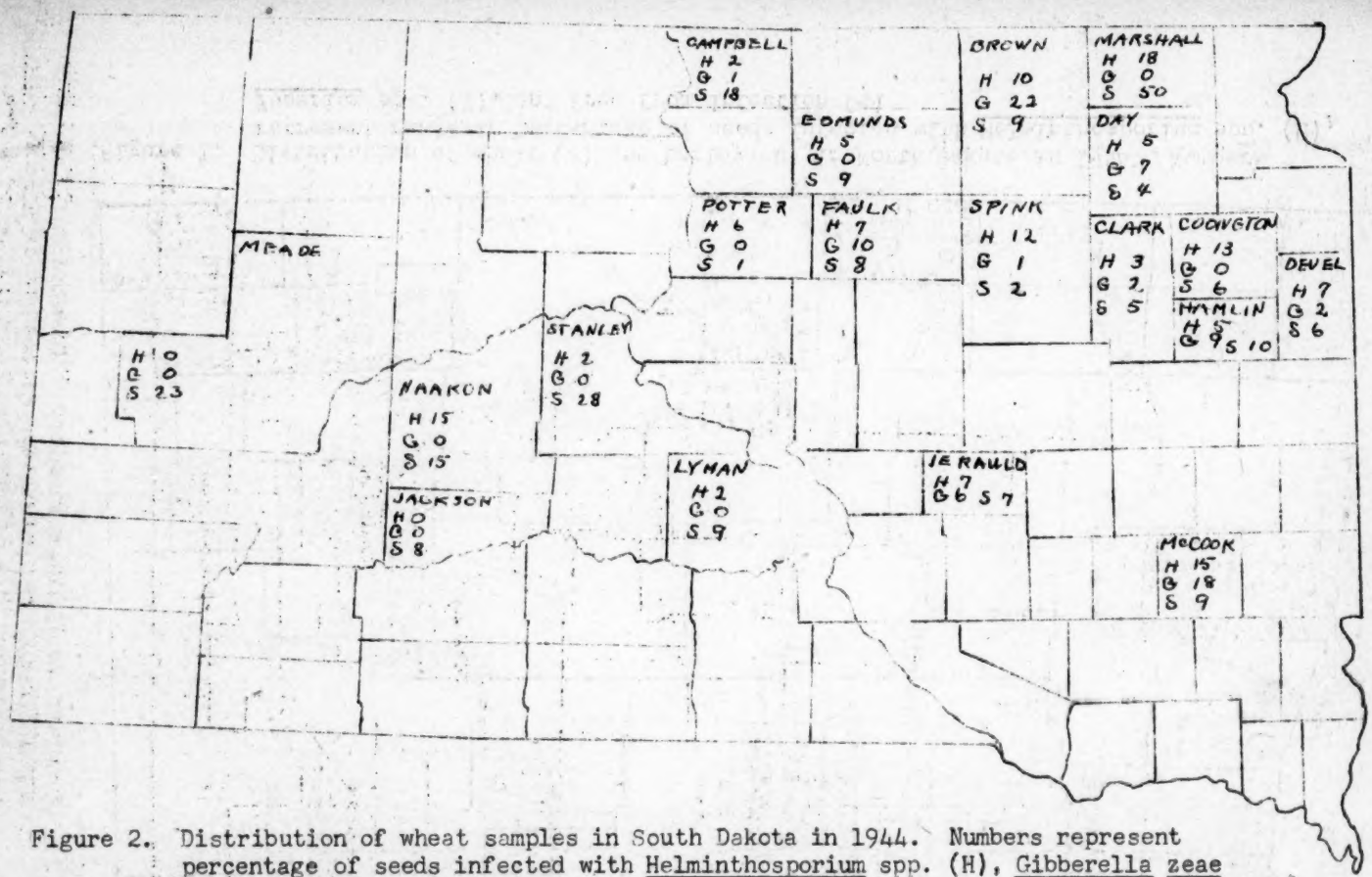


Figure 2. Distribution of wheat samples in South Dakota in 1944. Numbers represent percentage of seeds infected with Helminthosporium spp. (H), Gibberella zeae (G), and free from infection (S).

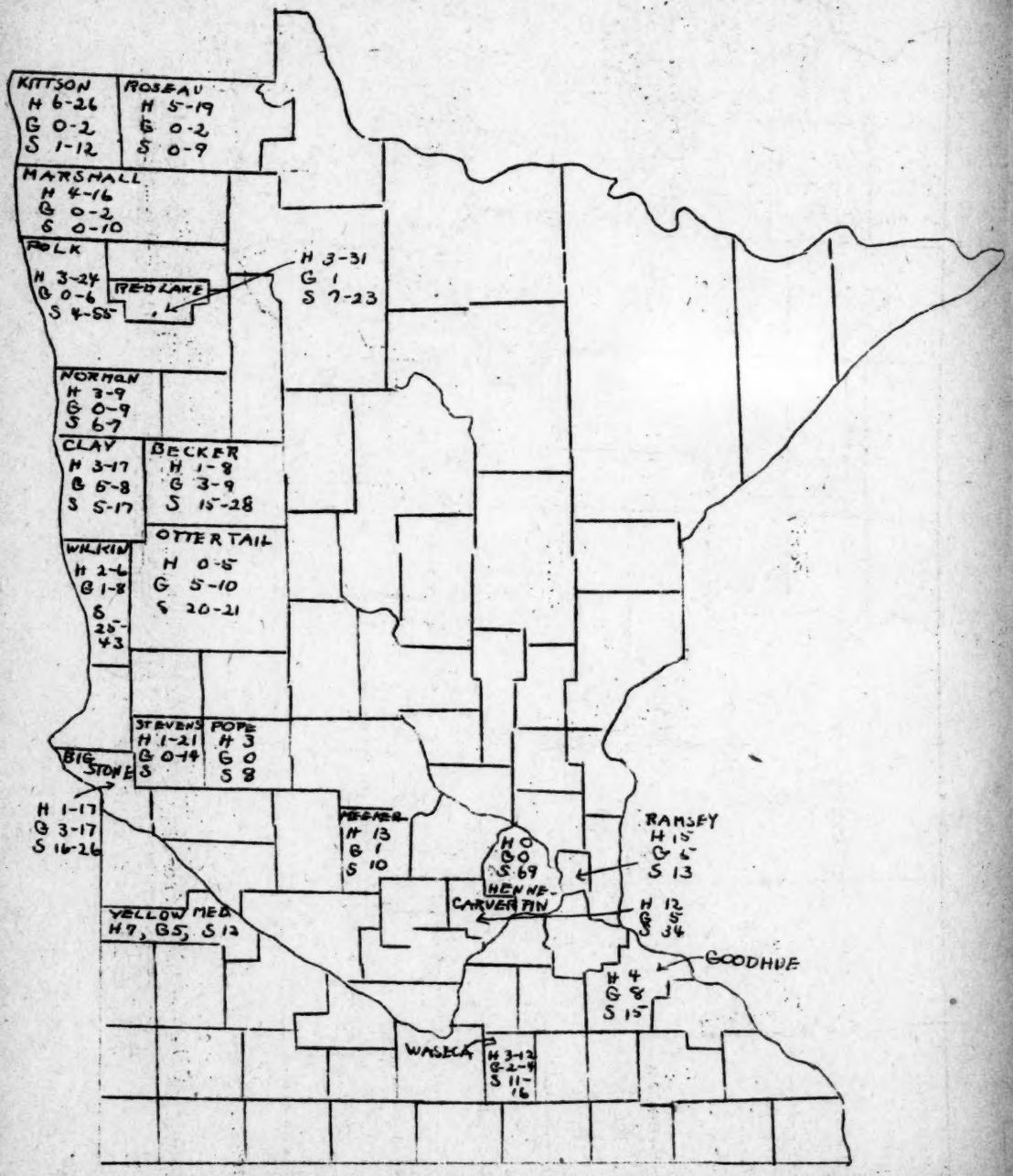


Figure 3. Distribution of wheat samples in Minnesota in 1944. Numbers represent range in percentage of seeds infected with Helminthosporium spp. (H), Gibberella zeae (G), and free from infection (S)

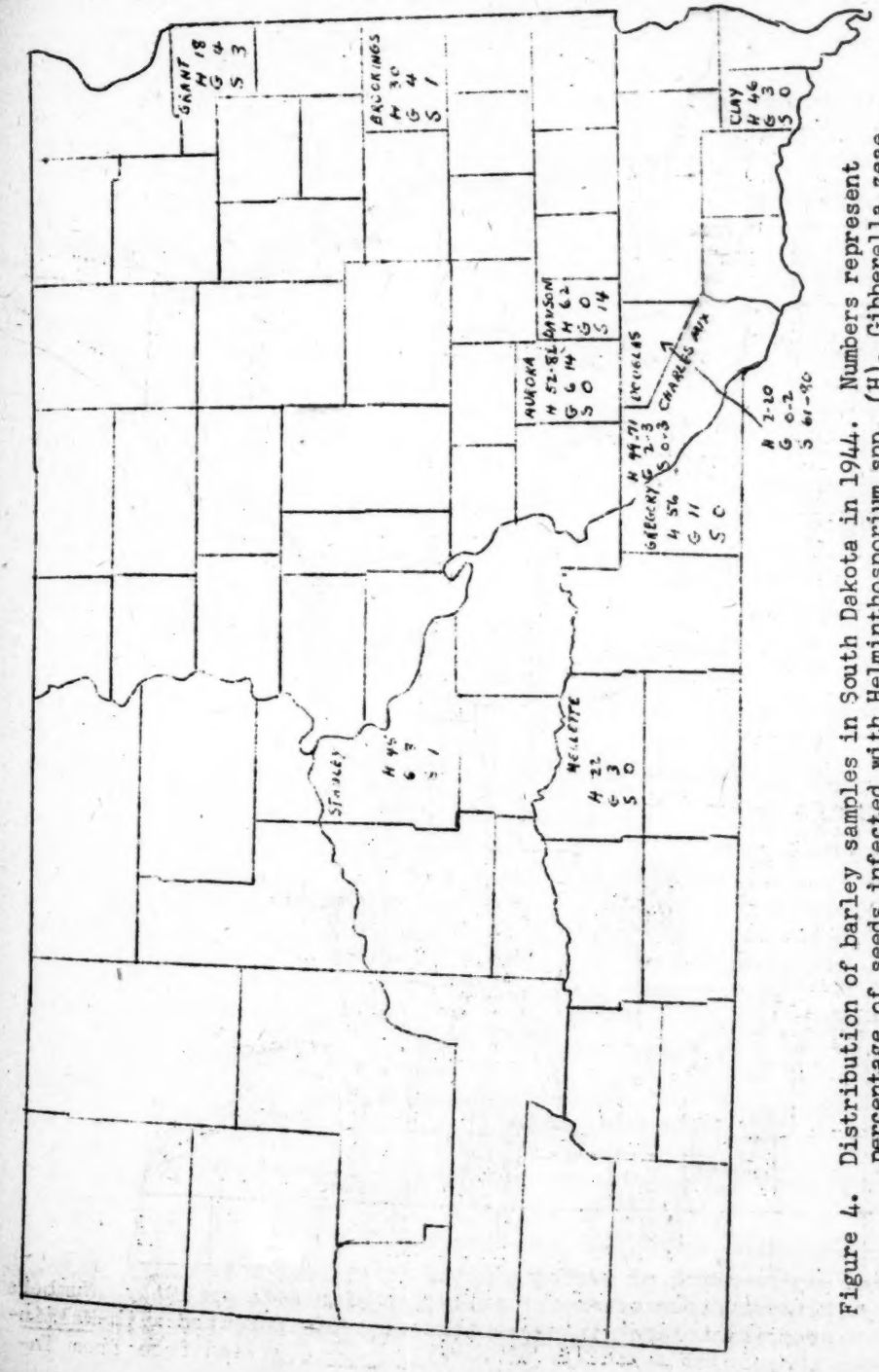


Figure 4. Distribution of barley samples in South Dakota in 1944. Numbers represent percentage of seeds infected with Helminthosporium spp. (H), Gibberella zeae (G), and free from infection (S)

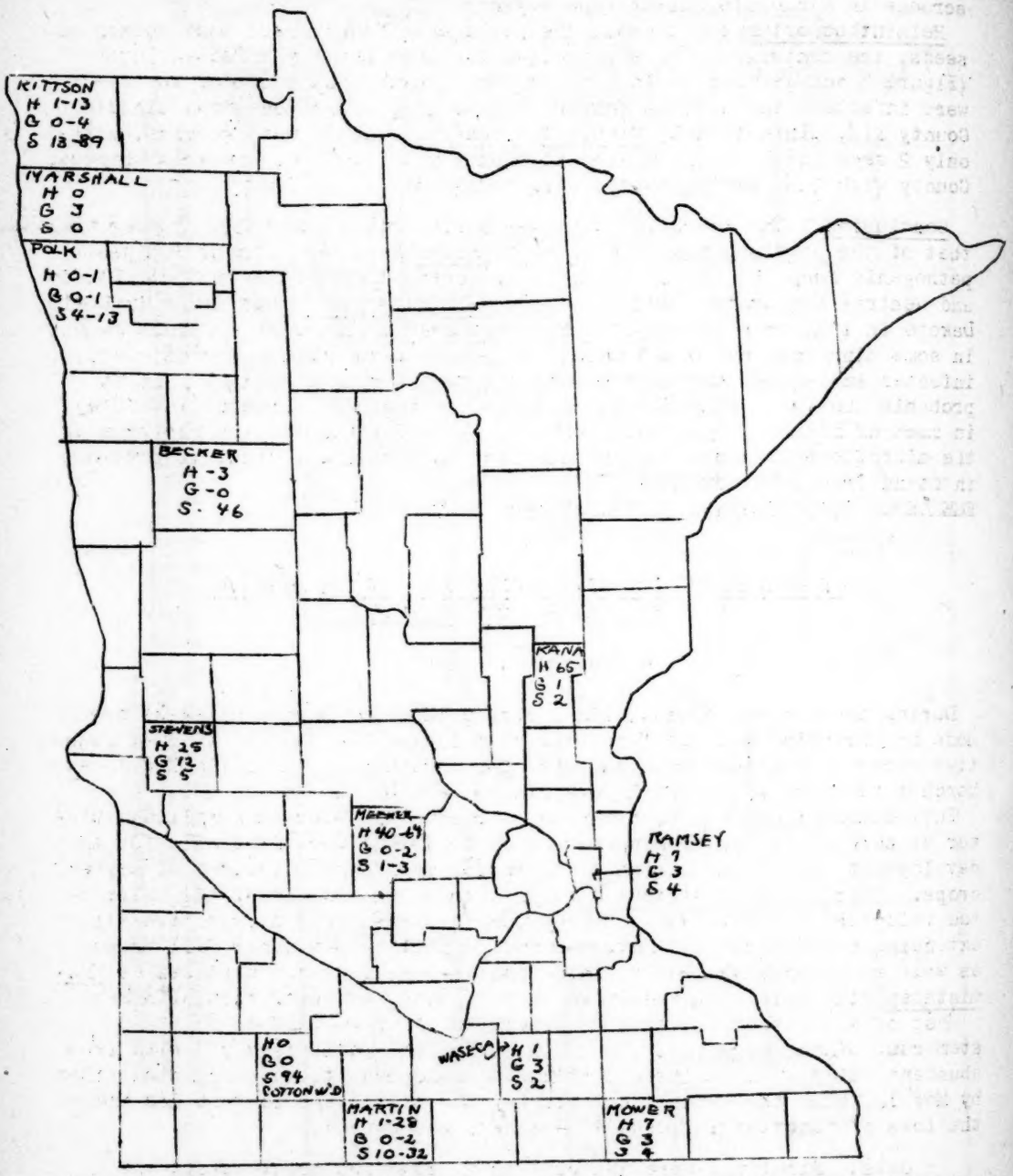


Figure 5. Distribution of barley samples in Minnesota in 1944. Numbers represent percentage of seeds infected with Helminthosporium spp. (H), Gibberella zeae (G), and free from infection (S).

acreage in Minnesota during recent years.

Helminthosporium spp., among the pathogenic fungi, were most common on seeds, the central counties producing the most heavily infected lots (Figure 5 and Table 6). In one lot from Meeker County 64% of the seeds were infected, in one from Kanabec County 65%, and in one from Lincoln County 41%. Infection by Gibberella zeae was low in most samples, with only 2 seed lots, one from Stevens County with 12%, and one from Chippewa County with 21%, having appreciable infection.

Conclusion. The microflora of 1944 barley seeds was quite similar to that of the previous year. Helminthosporium spp. were the predominant pathogenic fungi on seeds, infection reaching high levels in South Dakota and Central Minnesota. Somewhat less Helminthosporium was found in North Dakota in 1944 than in 1943. Gibberella zeae occurred in moderate amount in some Minnesota and South Dakota samples but no sample was as heavily infected in 1944 as the most severely infected sample in 1943. It is probable that good response to seed treatment can be expected in barley in much of Minnesota and South Dakota. In North Dakota, the analysis of the microflora does not suggest the expectation of any great improvement in stand from seed treatment.

EMERGENCY PLANT DISEASE PREVENTION PROJECT

## PREVALENCE AND DESTRUCTIVENESS OF CEREAL DISEASES IN ARKANSAS DURING 1945

Howard W. Larsh

During the current season, 1945, observations on cereal diseases were made in the principal ceral-growing counties of the State. In most counties various plantings were surveyed for diseases on the following dates: March 1 to March 17, April 7 to April 15, and May 14 to May 20.

Environmental conditions that prevailed during the preceding fall and winter as well as in the growing season of 1944-1945 were favorable for the development and dissemination of bacterial and fungal diseases of cereal crops. Fairly well distributed rains through the summer of 1944 permitted volunteer growth. The fall season was characterized by mild weather extending through much of November and permitting prolonged fall growth as well as several successive infection periods for such diseases as Helminthosporium leaf spot and crown rust of oats, and leaf rust of wheat.

Most of the diseases, with the exception of crown rust of oats and stem rust of the cereals, were found during the early survey. With the abundant rains, the diseases continued development to such an extent that by May 14, when the kernels had reached the milk stage in most instances, the loss of functional tissue to diseases was severe.

Oats. Plantings were observed in 29 counties constituting the principal oat-growing counties of the State. Approximately 1547 acres were surveyed.

Halo Blight (Phytomonas [Pseudomonas] coronafaciens] was widespread and caused slight to moderate damage this season. The environmental conditions that prevalied though most of the growing season were ideal for the development and dissemination of the causal organism. During the

early part of the growing season severe spotting and discoloration of the leaves was pronounced. Later on very little discoloration of the leaves occurred, although some spotting was evident in plantings observed during the May survey in Faulkner, Conway, Pope, Logan, and Franklin Counties.

Sterility or Blast (nonparasitic) occurred in varying amounts in most counties. The sterile, white spikelets were very conspicuous in most plantings and frequently resulted in reductions of 15 to 25% of the spikelets on an affected panicle. Two environmental factors may possibly explain the severe sterility in oats this season: namely (1) excessive rain in late winter and spring possibly preventing full development of the panicles, and (2) the heavy frosts on April 4 and 5.

Anthracnose (Colletotrichum graminicolum) was widespread and fairly destructive during the 1945 season. Very few plantings were absolutely free from this disease. Losses varied from a trace to an estimated 15%. Several of the standard commercial varieties seeded in Arkansas were attacked severely.

Helminthosporium Leaf Spot (Helminthosporium avenae), like anthracnose, was widespread in Arkansas during this season. Leaf spot was present in varying amounts in most instances. In several plantings severe spotting and killing of the lower leaves could be attributed to early infections. Plants severely attacked by leaf spot last fall either winter-killed or were stunted and failed to develop into healthy, vigorous plants. This disease was moderate to severe in the southern counties, although damage resulting from these early infections in 1945 was less than in 1944. The most severe infections occurred in Chicot, Ashley, Prairie, and Pulaski Counties.

Crown Rust (Puccinia coronata) was observed for the first time during the 1945 season on April 12. Its distribution and severity varied within the State. In the northwestern part crown rust began to develop rather late, even on susceptible varieties, as compared to other sections of the State. The abnormally cool, wet spring prevented development and dissemination in this region. However, in other sections crown rust caused moderate to severe reduction in yields. Susceptible varieties such as Lee, Forkedeer, Fulwin, Fulghum, and others, were infected to the extent that 75 to 100% of the functional tissue had been invaded at the time of the last survey (May 14 to May 20).

Perhaps the most interesting facts regarding crown rust during the 1945 season were the number of Bond hybrids found infected, and the degree of infection shown by the Red Rustproof strains. Percentages of infection were much higher on fall-planted Red Rustproofs than at any time since 1938, reaching as high as 75% in a few instances.

Stem rust (Puccinia graminis) infections were difficult to locate at the time of the last survey. Three plantings were observed with stem rust: in the trial plantings at the Rice Branch Experiment Station, Stuttgart, 2 varieties were lightly attacked, and in 2 commercial plantings infections were limited to a few plants and only a few pustules were observed on each diseased plant.

Loose Smut (Ustilago avenae) and Covered Smut (Ustilago levis) [U. kolleri]. Very few fields were free from smuts; however, in most instances infection was never greater than 1%. In plantings where seed treatment was not practiced infection ranged from 5 to 20%. Several smut-infected Red Rustproof strain fields were observed. The most severely infected

Red Rustproof planting occurred in Chicot County where at least 10% of the heads had smut. A few smutted plants were found in plots of the smut-resistant variety Letoria but it is not certain that these were not rogues.

Barley. Nine commercial plantings consisting of approximately 550 acres were surveyed. The trial and nursery plantings at the various experiment stations were also examined.

Bacterial Blight (Xanthomonas translucens) caused moderate to severe spotting on several varieties growing on the Main Experiment Station, Fayetteville. It was also observed in 2 of the large plantings in the State.

Scald (Rhynchosporium secalis) was the most common and destructive disease of barley in Arkansas during the 1945 season. Prevalence and destructiveness was even greater than in 1944. Trial plantings as well as commercial plantings were attacked while the plants were in the seedling stage. The loss in functional tissue varied from 50 to 100%, based on counts of the number of leaves or parts left alive in proportion to the total number of leaves counted per plant. In most areas, when the plants were in the flag-leaf stage the lower leaves were completely killed by this fungus and many of the younger leaves were severely attacked. The earliness and severity of the disease caused inevitable reductions in yield in all but one planting.

Stripe (Helminthosporium graminëum) occurred in 3 of the plantings surveyed. The most severely infected planting was observed near Marshall (Searcy County) on April 10. It was estimated that nearly 25% of the leaves were destroyed by stripe in this 75-acre planting. The finding and verification of the causal organism was the first authentic case of stripe causing damage to winter-grown barley in Arkansas.

Spot Blotch (Helminthosporium sativum) was the most prevalent and destructive of all of the Helminthosporium diseases this season, although as compared to last season infections were less severe in most instances. Nevertheless, several varieties in the plantings on the Main Experiment Station, Fayetteville, were severely spotted by this organism. The varieties Missouri Early Beardless and Fayette at the Fruit and Truck Branch Experiment Station, Hope, showed infections that reduced the functional tissued by 75%. Large commercial plantings were also attacked by this fungus; however, the most severely infected planting had an estimated 25% of the total leaf surface attacked.

Net Blotch (Helminthosporium teres) was observed in only 2 plantings this season. In each instance infections were limited to a few plants.

Powdery Mildew (Erysiphe graminis var. hordei) occurred rather early in most of the plantings and caused considerable loss during this season. Powdery mildew attacked the plants when they were very young, causing the leaves to become yellow and finally destroying them. Later in the season severe lodging, in some varieties, resulted from early infections of mildew. The environmental conditions of wet, cool weather that prevailed during the early growing season were conducive to the development and dissemination of the fungus. Barley plants were infected irrespective of their position in up land or in valley plantings, although the disease was much more destructive in lowland plantings.

Anthracnose (Colletotrichum graminicolum) was prevalent on barley during the 1945 growing season. In nearly every commercial planting plants killed by anthracnose could be located, but in no instance was the loss greater than 1%.

Scab or Fusarium Blight (Gibberella saubinetii) [G. zeae] was found in 2 instances. Only a few plants, in a localized area, were found to be attacked. In each instance the fungus was fruiting profusely and there was no difficulty in determining the causal organism.

Septoria Leaf Blotch (Septoria passerinii) occurred in several plantings. This disease was frequently found on the same plants affected by scald, and in many cases would have been overlooked if scald-infected leaves had not been examined with the microscope, since Septoria blotch was nearly masked by the scald infections.

Leaf Rust (Puccinia anomala) was found comparatively early in the 1945 growing season, being observed in late February and early March before the plants had reached the jointing stage. In most instances less than 25% of the leaf surface was invaded, although in nursery and trial plantings some of the varieties were infected to the extent that over 50% of the leaf surface was attacked. The severity and relative earliness of barley rust during the 1945 season differs greatly from the time of its first observation in 1944, when leaf rust was rather difficult to locate even late in the growing season.

Stem Rust (Puccinia graminis) was observed in 2 plantings during this season. In one planting in Searcy County an infection of 5% was estimated. The loss in yield due to this infection was estimated not to exceed 1%.

Loose Smut (Ustilago nuda) and Covered Smut (U. hordei) were found in all of the commercial plantings surveyed. In trial plantings at the experiment station where seed treatment was not practiced, considerable loose smut was present. Near Charleston (Franklin County) a loss of nearly 5% could be attributed to covered smut in one large planting.

Rye. Sixteen plantings were surveyed consisting of approximately 600 acres.

Anthracnose (Colletotrichum graminicolum) was the most prevalent and destructive disease of rye observed during the 1945 season in Arkansas. Cereal anthracnose was the cause of slight to moderate losses to all cereal crops this season; however, it caused its greatest losses in rye plantings. Very few fields were absolutely free from plants killed by anthracnose. Infections varied from a trace to nearly 100%. A 6-acre planting in Lonoke County was a total loss due to early infection.

Scab (Gibberella sp.) was collected in 2 plantings this season. The most severely infected field was observed in Jackson County where approximately 2% of the plants were attacked by scab.

Rhynchosporium Leaf Blotch (Rhynchosporium secalis) occurred in several of the plantings surveyed. Infection varied from 5 to nearly 100%. In 2 plantings on the Livestock and Forestry Branch Experiment Station, Batesville, infections of 100% were observed.

Powdery mildew (Erysiphe graminis var. secalis) caused slight losses in 3 plantings during this season. The infections were observed rather early in the season, and caused the lower leaves to turn yellow and die before the plants had reached the heading stage.

Leaf Rust (Puccinia rubigo-vera var. secalis) continued to be destructive during the 1945 season in Arkansas. Most of the infected plantings observed during early March lost most of their leaves before the kernels reached the dough stage. Abruzzi, Balbo, and Common rye were all severely attacked this season; however, plantings of Common rye lost considerably more leaves than did either Abruzzi or Balbo.

Stem Rust (Puccinia graminis) was observed in 3 plantings this season. At the time of the last survey the infections did not exceed 1% in most of the plantings. However, in Crawford County an infection of 15% was observed and some lodging resulting from stem rust was beginning to become evident.

Wheat. Twenty-seven plantings consisting of approximately 1140 acres were surveyed.

Speckled Leaf Blotch (Septoria tritici), as last year, was the most prevalent of all the diseases of wheat during the early growing season. This was especially true in plantings seeded early last fall. Late planted wheat showed very little speckled leaf blotch. In several of the early planted fields considerable yellowing of the plants and dead foliage could be attributed to early infection by this fungus. In 2 plantings in Northwestern Arkansas blotch infections were observed on the flag leaves. Considering the wheat-growing counties as a whole speckled leaf blotch caused less reduction in the functional leaf tissue, compared to the 1944 season.

Powdery Mildew (Erysiphe graminis var. tritici) was observed in early April of this season. In several plantings the lower leaves were affected severely enough to cause marked yellowing of the foliage. These early attacks of mildew destroyed several of the lower leaves before the plants had headed out.

Anthracnose (Colletotrichum graminicolum) was found in various plantings scattered throughout the wheat-growing counties of the State. In no instance, however, was the amount greater than a trace and very little reduction in yield resulted.

Scab (Gibberella sp.) occurred in 2 of the plantings surveyed. Infection varied within each field; however, a loss of approximately 2% of the plants, in a localized area, occurred in one field in Hempstead County.

Leaf Rust (Puccinia rubigo-vera var. tritici) was observed in varying amounts in all of the 27 plantings surveyed during this season. The development and dissemination of leaf rust in Arkansas did not reach the severity anticipated early in the growing season. Leaf rust in Arkansas as compared to Oklahoma was moderate. Nevertheless, fields were observed in which reductions in leaf surface of 75 to 90% occurred. Considering all of the 27 fields surveyed an average infection of between 40 and 65% was estimated, based on the modified Cobb scale, by the middle of May, but by the end of May infection ran close to 100% on susceptible varieties.

Stem Rust (Puccinia graminis) was observed in plantings in Crawford, Hempstead, Washington, and Independence Counties. The amount of infection varied from a trace to nearly 5% with an average infection of 2% estimated. Very little reduction in yield due to stem rust was anticipated during the 1945 season.

Loose Smut (Ustilago tritici) was observed in several plantings scattered throughout the State, the amount varying from a trace to nearly 15%. Smut was found in every planting where the seeds were not treated.

EMERGENCY PLANT DISEASE PREVENTION PROJECT

# DISEASES OF SMALL GRAINS IN MISSOURI

T. W. Bretz

During the week ending May 12, a survey for the incidence of disease on small grains was made in North-central and Northeastern Missouri. A similar survey was made from Central Missouri to the extreme southeastern corner of the State during the week ending May 26. Mr. J. R. Paulling, Extension Field Crops Specialist, and Mr. Sterling Kyd, Extension Entomologist, of the University of Missouri, accompanied the writer on a portion of the survey in the southeastern counties.

Wheat. This crop was largely in the joint stage of development in the counties lying north of the Missouri River during the second week of May. From Central Missouri southward, the fields ranged from the boot to milk stage of development, with the majority of fields in flower, during the week ending May 26.

Leaf rust (Puccinia triticina) [P. rubigo-vera var. tritici] was observed in all fields examined. Its prevalence was extremely variable within a given area, ranging from light, scattered infections, to instances of 100% prevalence. The severity of infection likewise was variable, ranging from a trace to as much as 75% (USDA scale) in some fields. In general, heavier leaf rust infection was observed in those counties lying to the south of the Missouri River than in those to the north, severity averaging from 15 to 20% in the southern area as compared with less than 5% in the north. Some loss from the disease seems inevitable, especially in the most heavily infected fields.

Speckled leaf blotch (Septoria tritici) was generally prevalent in all sections visited. The disease was usually light in severity and probably will account for only slight damage.

Powdery mildew (Erysiphe graminis) infection was observed in many fields. In a few fields the infection appeared to be uniformly distributed throughout the stand, but in most instances infection was found in spots where the plants had developed a very lush growth. The infection was generally very heavy and damaging on the lower leaves and leaf-sheaths and in all probability some loss will result in the most severely affected stands.

Fields showing mosaic (virus) diseased plants were observed in Lewis and Montgomery Counties. The disease was of a mild form and no apparent damage had occurred up to the time of the observations (plants in the joint stage).

Loose smut (Ustilago tritici) infection was observed in the majority of fields that had headed. The percentage of diseased heads ranged from a trace to 20, averaging approximately 5% for all fields examined.

Glume blotch (Septoria nodorum) was observed in a number of fields in the southern-most counties, the infection ranging from a trace to instances in which an estimated 75% of the heads showed few to many glumes affected.

Scab (Gibberella saubinetii) [G. zeae] infection, ranging from a trace to 3%, was observed in a few fields.

Barley. Fields ranged from the milk to mature stage of development and in the extreme southeastern counties a few fields were being harvested.

The head smuts, loose (Ustilago nuda or U. nigra), and covered (U. hordei), were found in all fields surveyed. Loose smut infections ranged from a trace to 15%, averaging about 7% for all fields examined. Covered smut infection ranged from a trace to 20%, averaging approximately 5%. One field was observed in which the two types of smut infection affected about 30%of the heads.

Powdery mildew was also observed in all fields. The stands were rather uniformly infected, but the intensity of infection varied from field to field, probably owing to differences in varietal reaction. In no instance was the infection extremely heavy, but in some fields moderately heavy infection was observed and probably some loss from the disease occurred.

In one field stripe (Helminthosporium gramineum) was affecting approximately 20% of the stand. Infected plants characteristically had failed to head.

In another stand a light but generally prevalent Septoria leaf spot (S. passerinii ?) infection was observed.

Brown spot (non-parasitic) was noted in a number of stands, the extent of spotting varying considerably from field to field, but occurring to a rather uniform degree within a given planting.

Scab was found in a few fields, ranging from a trace to 5% of the heads affected.

Rye. This crop was in the milk to soft dough stage of development. The prevalence of leaf rust (P. dispersa) [P. rubigo-vera var. secalis] was approximately 100% in all fields observed and the severity of infection ranged from less than 5% up to 65%. Scab infection ranged from a trace to 10%, averaging about 3%. One stand showed a uniformly light leaf spotting due to a Septoria species, possibly S. tritici, identified by Dr. D. A. Preston on another specimen of rye submitted for diagnosis earlier this season. A few plants of volunteer rye in a field of wheat in Boone County were found to be infected with loose smut (Ustilago tritici). These are believed to be the first records of the occurrence of Septoria leaf spot and loose smut on rye in this State.

Oats. Spring-planted oats were in the rosette to joint stage of development and winter oats in the southeastern counties were in the flower to milk stage. Crown rust (P. coronata) ranged from a trace in the spring oats to 100% prevalence and up to 85% severity in the fall-planted stands. A leaf spot, tentatively identified as a Helminthosporium infection and of minor importance to date, was observed rather generally in the spring-sown stands. Loose smut (U. avenae) was observed in all winter oat fields, ranging from a trace to as much as 30%, averaging approximately 8% for all stands.

EMERGENCY PLANT DISEASE PREVENTION PROJECT

## OTHER REPORTS ON DISEASES OF CEREAL CROPS

Reports are of Emergency Plant Disease Prevention Project surveys.

DISEASES ON OATS IN MISSISSIPPI AND LOUISIANA: Crown rust, in general, was light in most of the fields surveyed in the southern part of Mississippi during the first part of May, but in 3 fields in the vicinity of Wiggins

and in 2 fields near Hattiesburg, infection was rather heavy. Stem rust infection was heavy in 2 fields near Hattiesburg. Loose smut was found to be generally distributed throughout the area. Near Hattiesburg, one field was heavily infected.

A large number of oat fields was seen in Northeastern Louisiana. Crown rust was present in every field surveyed, but the percentage of infection was very low. Leaf spot (? Helminthosporium avenae) was generally prevalent although infection did not appear to be at all heavy. Loose smut was noted in trace amounts. Several fields in Ouachita and Natchitoches Parishes seemed to be completely ruined by the recent severe floods.--Douglas C. Bain.

SCALD ON RYE IN OREGON: Scald (Rhynchosporium secalis) was scattered through fields of rye in Linn and Lane Counties (May 3-5). Individual plants were severely affected, but in the fields as a whole damage was small.--Lytton W. Boyle

WHEAT RUSTS IN LOUISIANA: One wheat field was seen in Northeastern Louisiana, near Bastrop. Leaf rust infection was very high and trace amounts of stem rust were present.--Douglas C. Bain, May 1-12

WHEAT DISEASES IN INDIANA: In spite of considerable rain over the past month, Central Indiana wheat appeared in fair condition during the week ending May 19. If anything, the plants were becoming somewhat too rank and succulent. In many fields, the wheat was 2 1/2 to 3 feet high. Leaf rust was fairly prevalent. In some fields, at least 1 or 2 pustules were noted on all the lower leaves. Dying of lower leaves, however, appeared to be due to either new lesions of speckled leaf blotch or powdery mildew, both of which were quite abundant, the latter especially in fields where growth was lush. Mosaic (virus) symptoms were observed in several fields in Shelby County on upper leaves of wheat, mottling being quite striking. The plants were not stunted and could only be detected by examination of the individual fields. This is the first report of wheat mosaic from Shelby County, Indiana.--J. S. Tidd.

DWARF BUNT AND WINTER INJURY TO WHEAT IN IDAHO: A brief survey trip in the winter wheat section of Elmore and Camas Counties showed only slight loss from winter kill. There was evidence that in some of the low places wheat had died from flooding.

A trace of dwarf bunt (Tilletia tritici) [T. caries], identified by Dr. C. S. Holton of the Division of Cereal Crops and Diseases, was found in 2 fields. This is a new location for this disease.--Earle C. Blodgett, Apr. 30-May 6.

## DISEASES REPORTED ON LEGUMINOUS FORAGE AND COVER CROPS

Reports are of Emergency Plant Disease Prevention Project surveys.

BLACK STEM AND OTHER DISEASES OF ALFALFA IN PENNSYLVANIA: The week of May 6 was spent with Dr. R. S. Kirby of Pennsylvania State College, in Southeastern Pennsylvania, in Dauphin, Lebanon, Lancaster, Chester, Dela-

ware, Berks, Montgomery, Bucks, Lehigh, and Northampton Counties. Weather in this area continues cold and rainy. All plant growth is very slow for this time of year.

There is a very serious outbreak of black stem (Ascochyta imperfecta) on alfalfa in certain sections of the area surveyed. The disease appears to be present to some extent throughout the whole area. In Northampton County it seems likely that there will be an average loss of 50% of the first cutting, and in Lancaster County the loss will approach 35%. There is also an additional light loss to alfalfa in Lancaster County from freezing injury. The average incidence of black stem in 7 fields where careful notes were taken was 47% (total disease) with an average of 28% of the stems girdled. The occurrence ranged from 5 to 75% between the fields, and girdling from none in one field to 80% in another. Black stem was first found in Pennsylvania this year by Dr. Kirby on May 1. It was present at that time in Dauphin, Lebanon, and Berks Counties, with an average prevalence of about 1%.

Leaf spot (Pseudopeziza medicaginis) was seen in fields near Elizabethtown, Cornwall, Catasauqua, and Newburg. Incidence ranged from 2 to 20% with an average of 8%. Dr. Kirby reported the disease from Dauphin, Lebanon, Berks, and Northampton Counties May 1, with the greatest incidence of 5% at that time.

Downy Mildew (Peronospora trifoliorum) has been found this year in 2 locations in Northampton County. The disease has made but very little development to date.--Robert C. Cassell

STEM NEMATODE ON ALFALFA IN IDAHO: Two alfalfa fields in Canyon County and one in Elmore County showed extremely severe damage from stem nematode, Ditylenchus dipsaci. This pest has been known in the area before, and has done considerable damage.--Earle C. Blodgett, Apr. 30-May 6

SOYBEAN MOSAIC IN LOUISIANA: A very large acreage is planted to this cover crop this year. Thus far, the only disease that has been seen is mosaic (virus). In several fields in Avoyelles and Rapides Parishes the percentage of infected plants appears to be quite high.--Douglas C. Bain, May 1-12

OVULARIA LEAF SPOT OF VETCH IN CALIFORNIA: Ovularia schwarziana was causing spotting and falling of the lower leaves in one small planting near Watsonville.--Henry Schneider, May 13-19

## ARMILLARIA ROOT ROT IN THE SANTA CLARA VALLEY OF CALIFORNIA

Henry Schneider, E. W. Bodine, and H. Earl Thomas

Armillaria root rot (Armillaria mellea) is probably the most serious disease of stone fruits in California. No exact figures have been available on losses caused by the disease, however. In the winter and spring of 1944-1945 a survey was made in one area of the State. The entire width of the Santa Clara Valley between Coyote and Palo Alto was chosen for the survey. This area contains the largest part of the fruit-growing area of Santa Clara County. In 1943, the County had about 79,000 acres of the fol-

lowing susceptible crops: prunes, apricots, cherries, peaches, apples, almonds, and plums, listed in the order of acreage. The crop value was about $18,000,000.

Within the area chosen for the survey 13 well distributed smaller areas about 1 mile square, planted for the most part to susceptible trees, were chosen. Property maps were then obtained for these small areas, and 5 properties with susceptible trees were chosen at random for the survey in each area. Oak root fungus areas were determined by finding mycelial plaques of Armillaria in the roots of dead or dying trees. The acreage of infested ground was estimated for each property from the number of replaced or missing trees and the spacing of the trees. The total acreage infested was then divided by the total acreage for the 5 properties to obtain the percentage of infested land for the vicinity. The percentage of infested land for the 13 areas sampled was then averaged to indicate the amount of land infested for the Valley.

Results. It was determined that 10.7% of the Valley's land planted to susceptible crops was infested. Thirty-four properties of the 65 surveyed had one or more infested areas. All of the mile-square areas had one or more of the 5 properties infested. The amount of infested area per property varied from one tree space to almost the entire property.

Methods in Use to Combat the Disease. Walnuts are frequently planted on the very resistant California black walnut root stock, prunes and apricots are planted on the resistant #29 Myrobalan stock, and pears are planted on French pear stock, which is very resistant. Planting walnuts in spots in fruit orchards has the disadvantage of necessitating 2 kinds of cultural and spray practices within the same orchard. Also, the tops of walnut trees on the black walnut stock were frequently observed to be dying when they reached a bearing age (black-line disease). One case was observed, and several others heard of, where the black walnut stock was killed by oak root fungus. Myrobalan #29 stock is now being widely used, and dead prunes and apricots can be replaced without mixing cultural practices. Live prune trees on this stock 10 years old were observed on infested ground in one orchard, but most replants were too young to determine their resistance in the field. Pears were less frequently used in Armillaria spots.

EMERGENCY PLANT DISEASE PREVENTION PROJECT,
AND UNIVERSITY OF CALIFORNIA

## OTHER REPORTS ON DISEASES OF FRUIT CROPS

Except where noted, reports are by members of the Emergency Plant Disease Prevention Project.

APPLE DISEASES IN PENNSYLVANIA: The week of May 6 was spent with Dr. R. S. Kirby in Southeastern Pennsylvania. The weather in this area continues cold and rainy. All plant growth is very slow for this time of year.

Frosts and poor pollinating weather this spring have cut the apple crop in Southeastern Pennsylvania 50% or more by areas. Scab (Venturia inaequalis) is more severe this year in the area than it has been for a number

of years at this stage of fruit development (3 weeks after petal fall). According to Dr. Kirby, it is more severe in York, Lancaster, Lebanon, Berks, Lehigh, and Northampton Counties at present than in Montgomery, Bucks, Chester, and Delaware Counties. Usually a trace of scab could be found on the leaves in well-srayed orchards and from 15% upward in the unsprayed orchards or on check trees of sprayed orchards.

Frog-eye (Physalospora obtusa) was present as a trace only in most sprayed orchards. From 5 to 10% was found on unsprayed trees. Occasionally black rot twig cankers were to be noted.

Fire blight (Erwinia amylovora) of this season's infection was found on one tree in Florin on May 8. Fire blight had also been found by Dr. Kirby this year about a week previously.

Black pox (Helminthosporium papulosum) was seen in one orchard of Rome Beauty in North Brook (Chester County), and in one orchard of Rome Beauty and Smokehouse in Edgemont (Chester County). One was a poorly sprayed orchard and the other was exceptionally well sprayed, but in both cases the affected trees had many dead or dying branches.

A trace of powdery mildew (Podosphaera leucotricha) was seen that had been brought to the County Agent's office in Delaware County.--Robert C. Cassell

POWDERY MILDEW ON APPLE IN WESTERN STATES: In a large apple orchard near Fruitland, IDAHO, powdery mildew was very destructive on the young developing spurs, particularly on Jonathan. On many trees nearly half the spurs showed infection and some blossoms were dying as a result of the disease. Mildew had been prevalent in this orchard in 1944, but suggestions as to control measures had not been followed. In a neighbor's orchard partial control was effected with late delayed dormant lime sulfur.--Earle C. Blodgett, Apr. 30-May 6

Many terminal shoots were affected in 2 orchards observed near Watsonville, CALIFORNIA.--Henry Schneider, May 13-19

FIRE BLIGHT ON PEAR TREES IN CALIFORNIA: In response to a request by the Farm Adviser in Eldorado County a survey was made for fire blight of pears (Erwinia amylovora). Early stages were found of one of the most serious outbreaks in this area since 1930. Many of the fruits, pedicels, and spurs were severely affected as a result of blossom infection, and a slight amount of new shoot infection had also occurred. The disease was severe in orchards below Placerville, but orchards above the town were relatively free from it. Many orchards were so heavily affected that pruning out of all diseased spurs was not feasible under present conditions; therefore, at a meeting of growers, it was recommended that only diseased spurs that could be reached readily without the use of ladders be removed. This practice will prevent the organism from "running" into the main frame work of the trees. If hot dry weather comes soon, the spur infections may dry up; but warm wet weather will contribute to "running" of the blight and severe damage to the trees. This year's crop will be reduced considerably in any event. Bosc and Anjou trees were more severely affected than Bartlett.

The pear-growing district in the Delta area of Sacramento County was also surveyed and only a trace of blight was found there.--Henry Schneider, Emergency Plant Disease Prevention Project, and H. Earl Thomas, University of California. Apr. 30-May 5.

OTHER REPORTS ON PEAR DISEASES: A trace of scab (Venturia pyrina) was found on the leaves and fruit petioles at one location in Lancaster County, PENNSYLVANIA, on May 8.--Robert C. Cassell

Fire blight was seen on a few trees of an unknown variety between Hammond and Pontchatoula, LOUISIANA.--Douglas C. Bain, Apr. 9-14

A small orchard of Winter Nelis pears near Santa Cruz, CALIFORNIA, was slightly affected by blast (Phytomonas [Pseudomonas] syringae).--Henry Schneider, May 13-19

BROWN ROT ON PEACH AND OTHER HOSTS IN PENNSYLVANIA: Brown rot (Monilinia fructicola) was found in an orchard of peaches at Easton, where it was killing about 1% of the terminals. From 5 to 10% blossom blight occurrence was also found in a peach orchard at Catasauqua.

Bechtel's flowering crab was also seen at Easton with from 1 to 2% brown rot terminal killing. An ornamental cherry was observed at Florin with about 5% brown rot terminal killing, and flowering almond with 2 to 3% blossom infection was noted at Florin.--Robert C. Cassell, May 7-12.

STONE FRUIT DISEASES IN THE WILLAMETTE VALLEY OF OREGON: The prospects of the peach crop through this area presented an extremely variable and patchy picture at the beginning of May. Frost and the blossom or twig blight phase of brown rot (Sclerotinia [Monilinia] sp.) appear to have reduced the crop about 30%. Variation in amount of brown rot is large within individual orchards. The reason for much of this variation in incidence may be that the critical period for control in individual blossoms is too narrow for complete coverage to be obtained, when variable weather and costs of a practicable control schedule are considered.

Blight (Coryneum carpophilum) was severe in one locality of Clackamas County. It was prevalent in certain plantings in Lane County. Generally, this disease did not appear to be a primary cause of loss.

Die-back of twigs showing brown rot followed by Cytospora sp. is common. This was very severe in young plantings where little attention was paid to the control of brown rot on the small crop of fruit.

Peach leaf curl (Taphrina deformans) was prevalent. When no control was used or materials were not properly applied, the trees were completely defoliated. With few exceptions, however, practicable control was obtained.

Several instances of large losses of peach trees have been observed. The etiology of this condition has not been completely worked out. In some instances the loss has been small, affecting only a small percentage of the planting. At the other extreme, a planting of 80 trees became a complete loss between 3 and 5 years after planting. What appears to be a similar, if not the same, condition, but slower in development, was observed in older plantings. A sour sap or cankered condition develops in the trunk of the trees. This has been found to occur under a variety of circumstances. In one case severe loss occurred, whereas an adjacent planting was in excellent health.

Cherries, both sweet and sour, bloomed well and show prospects for a good crop. Sour cherries were more severely injured by brown rot blossom blight. The ultimate loss is still a matter of conjecture, depending on weather and success of control measures. The amount of this disease as on peaches, varies greatly within respective plantings. Where there was no evidence of control 50% of the blossoms were blighted at this early date.

Die-back of limbs up to 5/8 inches in diameter occurs in some older sweet cherry orchards. The cause is not apparent. These cases are of interest in contrast to the more common condition resulting from heart rot starting through large pruning wounds. In this die-back, the primary source of the trouble appears to be in the branches themselves, since the demarcation between apparently healthy and diseased tissues is quite sharp at the juncture between the smaller and larger branches.--Lytton W. Boyle

OTHER REPORTS ON DISEASES OF STONE FRUITS: By the middle of April, Coryneum blight was showing up severely in the vicinity of Moscow, IDAHO, on last year's peach wood. Infection undoubtedly occurred several weeks previously during the mild rainy weather which has persisted this winter. --Earle C. Blodgett.

Rust (Tranzschelia pruni-spinosae) was noted on peach and plum trees near Wiggins in Southern MISSISSIPPI.--Douglas C. Bain, May 1-12

Yellow bud mosaic (virus) of peach was recently observed in the Suisun Valley, in Solano County, CALIFORNIA, for the first time, and as a result of this finding one day was spent in looking for diseased trees on additional properties. Affected spots were found in 10 blocks of trees on 8 different properties. From 17 to as many as 35 or more infected trees were present in some cases.--Henry Schneider, Emergency Plant Disease Prevention Project, and H. Earl Thomas, University of California. May 7-12.

What appears to be a probable potash deficiency was responsible for the development of numerous red (later necrotic) areas between the veins of the leaf blades of a number of peach trees in a planting near Hayti, MISSOURI. Much defoliation was resulting and the partially developed fruits were shriveling and falling from the affected trees.--T. W. Bretz, May

Cherry leaf spot (Coccomyces hiemalis) infection is prevalent and causing much yellowing of foliage and defoliation in Southeastern MISSOURI. This condition generally has not been evident before mid-June or later.--T. W. Bretz, May

Seven of 75 trees of an unknown cherry variety were severely affected with crinkle (cause unknown) in one orchard near Santa Cruz, CALIFORNIA.--Henry Schneider, May 13-19

## CONIFER WINDBREAK AND NURSERY DISEASES IN ILLINOIS

J. S. Tidd

Parts of one week in February and 2 in March 1945 were devoted to a survey of conifer windbreaks, many, if not all, of which had been planted under the supervision of the Department of Forestry of the University of Illinois. Several small conifer nurseries from which some of the trees had come were also visited, as well as the Mason County State Nursery at Topeka, Illinois. Dr. J. N. Spaeth of the Department of Forestry, University of Illinois, accompanied the writer on one of the windbreak surveys and supervised in the inspection of bare root trees in cold storage at the State Nursery at Topeka. D. E. Pierce also accompanied on the State Nursery trip. Dr. Lindsay S. Olive of the Emergency Plant Disease Prevention staff aided materially in identification and examination of specimens.

## Nursery Stock in Storage

Because of poor survival of young deciduous trees from cold storage following planting in the spring, collections of Carolina poplar and black locust were made at the Mason County State Nursery and placed in moist chambers for mold development. The young trees had been dug in the fall and kept in piles on raised benches in the storage house cellar, the temperature of which was maintained above freezing. Sphagnum moss had been placed over the trees on each bench and wet several times a week with a fine spray. Some of the stock was in bundles, some in loose piles.

Fungi present on the roots and stems of Carolina poplar after being placed in moist chambers included the following: Rhizopus nigricans, and species of Alternaria and Cladosporium. Dr. Olive also isolated bacteria and found a few nematodes. Rhizopus appeared to be the most important. From black locust, the following were obtained: Mucor sp. and Rhizopus nigricans, these 2 probably the most important. Also present on black locust were species of Fusarium, Cladosporium, Aspergillus, Alternaria, and numerous bacteria. Dr. Olive was of the opinion that if a sufficient number of specimens were examined, probably any common soil fungus might be obtained in this manner.

If storage could be carried out and survival obtained without the covering of the stock with moist sphagnum, some of the molds could probably be eliminated. Healing-in the young trees in moist sand might be tried. Ways of maintaining the proper humidity and preventing desiccation may be another problem for experimentation.

## Conifer Nurseries

Two plantations with a total of around 15,000 young Norway spruce and a smaller number of white spruce were visited in Livingston County. The trees were 2 to 3 feet high and except for some defoliation on last year's twigs caused by hail, were in excellent condition and growing well. No diseases were found.

## Conifer Windbreaks

A total of 41 conifer windbreaks fron Central Illinois to the Wisconsin border were inspected. The trees ranged in height from 2 to 3 feet in some of the more recently planted windbreaks to 15 to 18 feet in those which were set out as far back as 1937 or 1938. Ganerally, the trees were located on the northern and western sides of the farm buildings to form an "L" shaped windbreak which was 3 rows wide, the trees 12 to 14 feet apart. Norway spruce was the predominating tree planted, followed by Douglas fir and white spruce. Concolor fir and various species of pines, such as Austrian, Scotch, and Norway, were encountered in small numbers in several of the plantings. A few arbor-vitae were found at one place. An occasional Colorado blue spruce had been planted for variety in several instances. Many of the windbreaks were entirely of Norway spruce, 2 were all Douglas fir, and one was entirely white spruce. Douglas fir was mixed with spruce in some. As many as 187 trees were present in one windbreak but most averaged 75 to 125 trees.

Cytospora kunzei. Cytospora canker was found in 2 Norway spruce windbreaks. One of these, in Champaign County, consisted of trees but

2 1/2 feet high, which had been set out in 1942. The lower limbs on 10% were badly infected. The transplants had come from Pennsylvania and may have been infected when received. Several large, old Norway spruce, however, were growing nearby and may have been the source of inoculum. No limbs were present on them for 20 to 25 feet up the trunks. The owner reported the lower limbs began to die some years ago and each year since, limbs farther up the trunks had died.

The second windbreak infected with Cytospora kunzei was in DeKalb County and consisted of 99 Norway spruce trees from 10 to 12 feet high, which had been set out in 1940 and 1941. Lower limbs on some trees and occasional limbs 4 to 5 feet from the ground on others were diseased. A total of 25% of the trees had cankers. The dead and dying limbs contrasted sharply with the green healthy portions of the trees. Exudate of resin of a whitish or gray color was common on the diseased branches. In some instances, it appeared that the infection had worked back to the main trunk and that the trees were doomed. Spore "horns" or tendrils were beginning to form and could easily be found. No mechanical injury was noted. Except for the diseased limbs, the trees were growing well. Norway spruce in other windbreaks from the same Illinois plantation that these trees had been secured, showed no Cytospora so that the possibility of infected trees having been planted probably can be ruled out. Large conifer trees were reported by neighbors to have been removed from this farm several years ago and may have been the source of inoculum.

Botryosphaeria ribis. This fungus was found on twigs of Norway spruce from a windbreak in Champaign County. Some defoliation was present but whether this was due to the fungus or to bagworm was not ascertained. According to information furnished the writer, this fungus is probably capable of causing infection only when the host is adversely affected by unfavorable environmental conditions.

Bagworm and Spider Injury. Cases of bagworm were found hanging from twigs of Norway spruce, white spruce, and Douglas fir in 7 windbreaks. Damage from the worms was not extensive because several of the owners had sprayed to control or removed the cases during the winter. In several instances, infested nearby red-cedars appeared to be the source from which the pests came. Some of the leaves of Norway spruce (also a few white spruce) were mottled, yellow, or gray in at least one quarter of the windbreaks, red spider mides being responsible. Identification was based on the presence of eggs on the twigs and leaves. However, the spruce spider mite may have been involved also.

Physiological Disturbances. Some defoliation as well as browning of needles of Norway spruce on the southern or western sides of the trees was encountered. This was more common on trees in the outside rows. Less or none at all was observed on trees to the inside, these being fairly well protected from wind. Such defoliation and browning was attributed to scorch or winter drying or both. Dry winds over a period of time apparently caused a loss of water from needles on the exposed trees, greater than it could be replaced from the soil.

In several windbreaks on uneven ground, dying of Norway and white spruce in low areas was noted. Excess water, presumably resulting in an insufficiency of oxygen for the roots, may have been the cause of death as no

signs of parasitic trouble were found.

Where parts of windbreaks adjoined a cattle yard and seepage of water and nutrients occurred, poor growth of the trees was common and in a number of cases, death of trees had resulted. This was true of both Norway spruce and Douglas fir. Whether too much water or an excess of nitrogen or both were responsible was not determined.

Mechanical and Other Injuries. In several instances, livestock, principally sheep, had been allowed to graze between the trees and had chewed off the ends of innumerable branches. Chickens were apparently the reason for lack of leaves on the lowermost limbs in 2 windbreaks. The needles had been picked off. Fire damage was noted in 2 windbreaks. Carelessness in cutting the grass between trees with mowing machines and brushing against the trees with farm implements was responsible for broken limbs in a number of cases. Plowing or disking between trees resulted in severe root injury in one windbreak in Bureau County, death of a number of trees being directly traceable to root damage. A scythe, intelligently used several times during the year, would appear to the writer as the most efficient way to keep the grass cut in windbreaks and would eliminate much of the disaster which results from gardening, mowing, or allowing farm animals to graze between the trees.

In concluding, it can be stated that the various troubles encountered in the survey were not unexpected. Indeed it is somewhat surprising that other fungus diseases (such as Lophodermium leaf cast) were not present, or other insect troubles. Injuries due to machines and cattle will occur wherever the owner or tenant is careless. Of the 41 conifer windbreaks surveyed, 50% could be considered as good in spite of occasional losses due to physiological troubles and slight mite and bagworm injury. Indeed, several of the windbreaks were excellent; these were on the well managed, best appearing farms.

Inasmuch as other conifer species are also subject to a wide variety of troubles, it would appear at this time that the selection of Norway spruce for windbreaks in Illinois had been a prudent one. Although the writer is not a forester, it seems to him that Douglas fir and white spruce appear to have value, as do some of the pines. Nevertheless, in all plantings of this type, due consideration must be given to susceptibility to fungus and insect attack, as well as to site.

EMERGENCY PLANT DISEASE PREVENTION PROJECT

## REPORTS ON POTATO LATE BLIGHT

According to C. M. Wright, reporting from the South Fork of Suffolk County in the New York State College of Agriculture Weekly News Letter, late blight (Phytophthora infestans) has been observed on Long Island. In the May 21 issue he reports

"Late blight was observed in a cull pile near Bridgehampton on May 17. Frequent rains, heavy fogs, and low temperatures indicate that it may be becoming established in the fields."

On May 28 he wrote

"Although the weather has turned clear this past week, temperatures

continue to be favorable for the development of late blight. The disease was located on a few plants in a field near Watermill and undoubtedly could be found elsewhere if a careful search were made."

In the Southern States, Douglas C. Bain reports occurrence in Southern Mississippi, as follows,

"At Columbia, in Marion County, the County Agent reported a few light outbreaks of late blight, which caused only slight damage. The disease was not seen elsewhere." (May 14-26).

## HOW ACCURATELY ARE WE ESTIMATING PLANT DISEASE LOSSES?

Recently a number of pathologists who are interested in the future of plant disease surveying have been giving serious thought to means for improving the reliability of our estimates of plant disease intensity and translation of these into terms of crop loss. It is felt by some that, owing to lack of an experimental basis for our estimations, to our natural inclination to underestimate, and to variations in the personal element, our estimates of loss may frequently be at marked variance with the actual losses sustained. If this is true, attention should be given to correction of these errors through experiments on the measurement of plant disease losses associated with given intensities of disease at given growth stages of the host plant, and to "calibrating the observer", in order that our survey results will have the greatest reliability and usefulness.

The following "quiz" has been devised in order to obtain some evidence on our accuracy in crop loss appraisal, to assist in self-analysis and planning for increased accuracy in the future. Each item in the "quiz" is based on one to many published accounts of loss measurements. Owing to scarcity of such accounts, the list is not as representative as would be desired; root diseases, for example, deserve a more conspicuous place, but the data available on losses caused by these are very meager. In some cases the question asked is less definite than desired, but this, too, relates to the inadequacy of the literature. It can be pointed out that loss percent from a given disease intensity will vary somewhat with ecology, host variety, cultural practices, method of measurement, etc., but where several investigators have made measurements of losses from a given disease, the results have usually been comparable, so that the results given in the "Answers" at least show the order of magnitude. Admitting these limitations, it is believed that the results of the "quiz" may be illuminating and helpful in our future survey planning and practice.

You may be interested in testing your own loss-appraisal accuracy by filling in those answers on the "quiz" that concern diseases which are familiar to you. The answers, and the literature citations on which they are based, will appear in the next number of the "Reporter". If you believe that the summarized results of the "quiz" would be interesting personally and helpful to the work of the survey, will you tear out the filled-in page (there is a duplicate so that your file copy will remain complete), and send it to the undersigned, who will summarize the results and make them available to you. Your data sheet need not be signed. It would also be appreciated if you care to add any comments that might assist in interpreting the results.

## The "Quiz"

In each case below, the order of magnitude of yield reduction (disregarding loss in quality) is known from loss-measurement experiments. Test yourself by filling in your estimates. An error of ± 10% is excusable. Omit those referring to diseases with which you are not familiar. The correct answers will appear in the next number of the "Reporter".

(a) What would be the approximate loss from 100% infection of potatoes with: leafroll? ___%; latent mosaic (virus X)? ___%; mild mosaic? ___%; rugose mosaic? ___%; spindle tuber? ___%.

(b) When tomato plants become infected with mosaic 1 month after setting in the field, what is the approximate yield reduction per infected plant? ___%.

(c) If tobacco contracts mosaic 3 weeks after setting, what is the average loss in yield? ___% and in value? ___%.

(d) A survey in an important pea producing State showed that in 3 fields out of 10, Aphanomyces root rot was moderate to severe (5 to 100% of plants with some degree of root infection). What was the average crop loss in these fields? ___%.

(e) If leaf rust completes destruction of all wheat leaves at blossoming time, to what extent will the potential crop be reduced? ___%.

(f) What do you estimate the loss in average infected plants with corn smut (average of all types and locations of boils)? ___%; severe early Septoria leaf spot of tomato? ___%; sugar cane mosaic? ___%.

(g) Samples of threshed wheat grading "medium smutty" contain 5-10 smut balls per 50 gm. What percentage of smut in the field is required, with average threshing, to produce this many smut balls? ___%.

(h) In a clover field Macrosporium leaf spot is affecting 45% of the leaves, the lesions involving 36% of the total leaf area. What is the loss in hay tonnage? ___%.

(i) What will be the % crop loss from destruction of: 1/3 of the leaves of corn when 40% of the tassels are showing? ___%; 1/2 of the leaves of onion 3 weeks before harvest? ___%; all leaves of flax between bud and soft dough stage? ___%.

(j) In a cotton field, 20% of the plants were killed (and a proportionate number of others infected) with cotton root rot at picking time. What was the yield reduction? ___%.

---

Please remove duplicate page and send, unsigned, to K. Starr Chester, Agricultural Experiment Station, Stillwater, Oklahoma

## The "Quiz"

In each case below, the order of magnitude of yield reduction (disregarding loss in quality) is known from loss-measurement experiments. Test yourself by filling in your estimates. An error of ± 10% is excusable. Omit those referring to diseases with which you are not familiar. The correct answers will appear in the next number of the "Reporter".

(a) What would be the approximate loss from 100% infection of potatoes with: leafroll? ___%; latent mosaic (virus X)? ___%; mild mosaic? ___%; rugose mosaic? ___%; spindle tuber? ___%.

(b) When tomato plants become infected with mosaic 1 month after setting in the field, what is the approximate yield reduction per infected plant? ___%.

(c) If tobacco contracts mosaic 3 weeks after setting, what is the average loss in yield? ___% and in value? ___%.

(d) A survey in an important pea producing State showed that in 3 fields out of 10, Aphanomyces root rot was moderate to severe (5 to 100% of plants with some degree of root infection). What was the average crop loss in these fields? ___%.

(e) If leaf rust completes destruction of all wheat leaves at blossoming time, to what extent will the potential crop be reduced? ___%.

(f) What do you estimate the loss in average infected plants with corn smut (average of all types and locations of boils)? ___%; severe early Septoria leaf spot of tomato? ___%; sugar cane mosaic? ___%.

(g) Samples of threshed wheat grading "medium smutty" contain 5-10 smut balls per 50 gm. What percentage of smut in the field is required, with average threshing, to produce this many smut balls? ___%.

(h) In a clover field Macrosporium leaf spot is affecting 45% of the leaves, the lesions involving 36% of the total leaf area. What is the loss in hay tonnage? ___%.

(i) What will be the % crop loss from destruction of: 1/3 of the leaves of corn when 40% of the tassels are showing? ___%; 1/2 of the leaves of onion 3 weeks before harvest? ___%; all leaves of flax between bud and soft dough stage? ___%.

(j) In a cotton field, 20% of the plants were killed (and a proportionate number of others infected) with cotton root rot at picking time. What was the yield reduction? ___%.

---

Please remove duplicate page and send, unsigned, to K. Starr Chester, Agricultural Experiment Station, Stillwater, Oklahoma